February - March 1969

EMO

Statement by Minister

Project PHOENIX

Government in War

Fallout Protection

Economic Planning

Effectiveness of Civil Defence

Young Beliefs about C.D.

Index - 1968

CANADA EMERGENCY MEASURES ORGANIZATION

Published by

Canada Emergency Measures Organization, Ottawa, Ont.

Director General: C. R. PATTERSON

Vol. 9 • No. 1 February-March 1969

Contents

Statement by Minister of National Defence 1

Project PHOENIX 2

Government in War 7

Fallout Protection Planning 12

Economic Planning for Wartime 20

Effectiveness of Civil Defense 22

Young Beliefs about Civil Defense 26

EMO National Digest Index — 1968 28

The EMO NATIONAL DIGEST publishes six editions annually to provide current information on a broad range of subjects dealing with civil emergency planning. The magazine is published in English and French and may be obtained by writing to the Canada Emergency Measures Organization, Ottawa 2, Ont.

In addition to publishing articles which reflect Canadian Government policy the Digest may also publish articles by private individuals on subjects of current interest to the emergency measures programme. The views of these contributors are not necessarily subscribed to by the Federal Government.

Editor: A. M. STIRTON

THE QUEEN'S PRINTER, OTTAWA, 1969

Statement by the Minister of National Defence

The Hon. Léo Cadieux

In December, 1968, I was invited to appear before the Standing Committee on External Affairs and National Defence to give my views on our responsibilities within the NATO alliance.

Most of my testimony was centered around our military commitments and the collective approach to defence problems, but in my statement I told the Committee, "The major threat to the security of Canada and the Canadian people comes from the prospect of an intercontinental nuclear exchange arising out of a conflict of interest or of ideology between the superpowers". Because such a nuclear exchange could devastate great areas of our land with a consequent terrible loss of life I believe that planning for defence must not only include military operations here and abroad but civil preparedness as well. Civil emergency planning in peacetime will contribute to the total defence of the country by developing preparations to save the lives of many thousands of Canadians who might otherwise become casualties.

Peacetime planning for survival actions in the event of a national emergency is a serious responsibility which must be met by federal departments and agencies, provincial, county and municipal governments and civilian industry. The Canada Emergency Measures Organization which has recently been added to my responsibility in the Department of National Defence, must continue to stimulate and coordinate civil emergency planning activities at all levels and in every related sphere. I believe that future efforts of Canada EMO, as an integral part of the defence community, will do much in continuing to help develop an effective total defence of our nation.

PROJECT PHOENIX

by

S. N. White, Acting Director, Planning Branch
Canada Emergency Measures Organization

The Phoenix originated as a calendar pictograph because the Ancient Egyptians had a calendar of exactly 365 days, an intercalary period of five days and no leap year. their time therefore, grew further and further out of phase with the sun until after 1460 years, the uncalculated time amounted to a full year and the calendar was once more in phase with the sun. This process was pictured by means of the phoenix starting in a palm tree as a worm representing the few hours initial variance growing into a chick, becoming a full grown eagle, and at the end of 1460 years returning to a nest of palm branches to be consumed by fire. From the ashes emerged the worm which inaugurated the next cycle.

Introduction

1968 was an eventful year for civil emergency planning, climaxing a steady march of events towards changes which had become inevitable. Between east and west there had been an uneasy relaxation of tension which some called a détente, but which probably stemmed from the realization by the super powers that each now possessed sufficient second strike capability to remove most of the advantage, and hence attractiveness of a surprise attack with strategic nuclear weapons. This meant that the eastern and western powers would now try to out-manoeuvre each other by measures short of all-out nuclear war, and that if only we could recognize the signs, there should now be a potential for strategic warning. Internationally and nationally there developed greater competition for money which was required more for economic and social development than for apparently less urgent defence measures. Finally, the advent of new management techniques and procedures on the government scene created an awareness among all program managers for the need to analyse objectives and evaluate programs towards their achievement. Clearly, the time had come for another close look at our civil emergency planning.

Certain preliminary steps were desirable and certain authorities essential before such an investigation could take place. However, with the added urgency which impending financial reductions imparted, all essential preliminaries were quickly completed and Project Phoenix was launched in January 1968.

Background

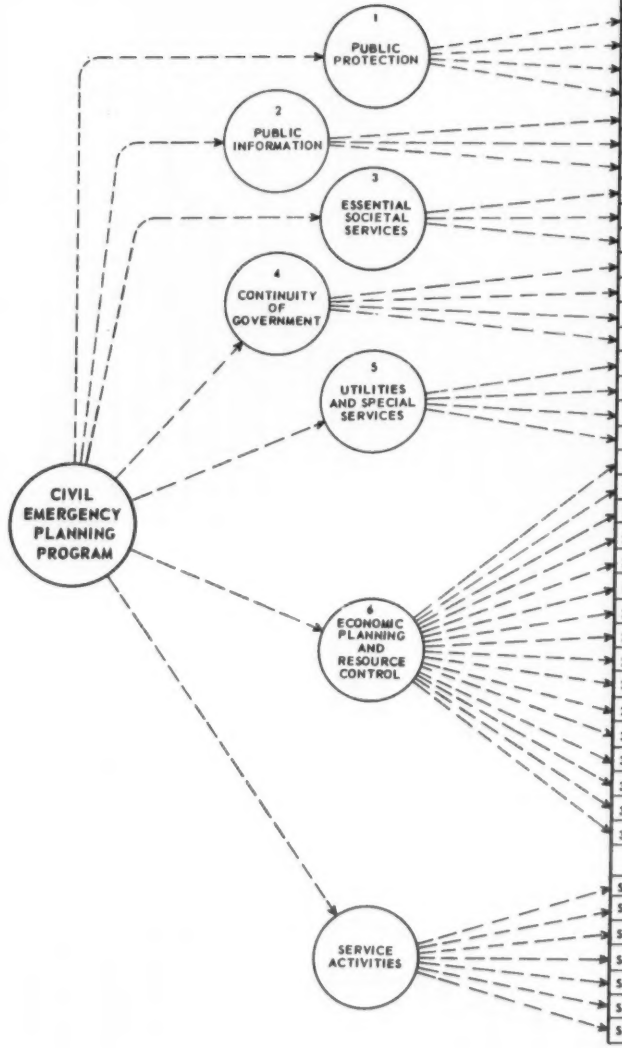
To understand the purpose of Project Phoenix is to appreciate the shortcomings which had developed in civil emergency measures over the years. These were mainly attributable to the fact that the previous ten years had seen a considerable growth in the scope and complexity of emergency measures and while new analytical procedures and the applications of management science were being introduced elsewhere in business and government, they had not yet found their way into civil emergency measures.

There were four major shortcomings which had become apparent to those responsible for the coordination of emergency measures. First, there was no satisfactory method of assessing the nation's readiness and capability for meeting the loads which would be imposed on the civil structure during a war emergency. Second, and this was becoming more serious with the reduction of financial support, there was no satisfactory method for deciding which civil emergency measures should have priority in the allocation of the limited funds available, or as a corollary, of determining the effect on the total program of suspending or withdrawing support from one of its component activities. Third, the goals for the many departmental and agency functions were stated in a variety of ways, some subjective and some quantitative; but even more important than this was the fact that although there is a great deal of interdependency between emergency functions, the goals of these functions had not, in all cases, been selected and coordinated to be compatible with one another, or to achieve a degree of balance throughout the national capability. Fourth, the zeal and energy of some managers of emergency functions was in sharp contrast to the lack of interest or support afforded to others and this naturally affected the rate of development of the various functions, so that inevitably, some activities had out-stripped the field while others lagged far behind. A degree of imbalance had, therefore, been developed and this would, if permitted to continue, result in an uneconomical use of funds and manpower.

The Project Phoenix Study

Stripped of their official language, the terms of reference for Project Phoenix were in the main, to study our national emergency measures in the greatest possible depth, and devise systems which, if applied, would tend to correct the above faults, all of which it will be noticed, were procedural shortcomings rather than faults of substance within the emergency measures already being implemented.

Essentially, the task that fell to the Project Phoenix staff was to carry out a detailed analysis of everything



INDEX TO CHARTS					
	FEDERAL			PROVINCIAL	
1	DISPERSAL	See Federal Chart 1A	1	DISPERSAL	See Provincial Chart 1
2	INDIVIDUAL PROTECTION	See Federal Chart 1A	2	INDIVIDUAL PROTECTION	See Provincial Chart 1
3	N.B.C. DEFENCE	See Federal Chart 1A	3	N.B.C. DEFENCE	See Provincial Chart 1
4	SHELTER	See Federal Chart 1B	4	SHELTER	See Provincial Chart 1
5	EMERGENCY PUBLIC INFORMATION SERVICES	See Federal Chart 2	5	EMERG. PUBLIC INFORMATION SERVICES	See Provincial Chart 2
6	PEACETIME PUBLIC INFORMATION SERVICES	See Federal Chart 2	6	PEACETIME PUBLIC INFORMATION SERVICES	See Provincial Chart 2
7	WARNING	See Federal Chart 2	7	WARNING	See Provincial Chart 2
8	EDUCATION	See Federal Chart 3	8	EDUCATION	See Provincial Chart 3
9	HEALTH	See Federal Chart 3	9	HEALTH	See Provincial Chart 3
10	WELFARE	See Federal Chart 3	10	WELFARE	See Provincial Chart 3
11	EMERGENCY OPERATION CENTRES	See Federal Chart 4	11	EMERGENCY OPERATING CENTRES	See Provincial Chart 4
12	INTERNATIONAL	See Federal Chart 4	12	INTERNATIONAL	See Provincial Chart 4
13	POLICY, OPERATIONAL CONCEPTS & PLANS	See Federal Chart 4	13	POLICY, OPERATIONAL CONCEPTS & PLANS	See Provincial Chart 4
14	PROCEDURES AND READINESS	See Federal Chart 4	14	PROCEDURES & READINESS	See Provincial Chart 4
15	FIRE	See Federal Chart 5	15	FIRE	See Provincial Chart 5
16	RESCUE	See Federal Chart 5	16	RESCUE	See Provincial Chart 5
17	UTILITIES	See Federal Chart 5	17	UTILITIES	See Provincial Chart 5
18	SPECIAL ENGINEERING SERVICES	See Federal Chart 5	18	SPECIAL ENGINEERING SERVICES	See Provincial Chart 5
19	ACCOMMODATION	See Federal Chart 6A	19	ACCOMMODATION	See Provincial Chart 6
20	AGRICULTURE	See Federal Chart 6A	20	AGRICULTURE	See Provincial Chart 6
21	DATA DEVELOPMENT	See Federal Chart 6A	21		
22	ENERGY & FUEL	See Federal Chart 6B	22	ENERGY & FUEL	See Provincial Chart 6
23	ENGINEERING & CONSTRUCTION RESOURCES	See Federal Chart 6B	23	ENGINEERING & CONSTRUCTION RESOURCES	See Provincial Chart 6
24	ESSENTIAL MATERIALS	See Federal Chart 6B	24		
25	FISHERIES	See Federal Chart 6C	25	FISHERIES	See Provincial Chart 6
26	FINANCE	See Federal Chart 6C	26	FINANCE	See Provincial Chart 6
27	FOOD & FEED (EXCEPT FISH)	See Federal Chart 6C	27	FOOD & FEED (EXCEPT FISH)	See Provincial Chart 6
28	INDUSTRIAL PREPARDNESS	See Federal Chart 6C	28	INDUSTRIAL PREPARDNESS	See Provincial Chart 6
29	INDUSTRIAL PRODUCTION	See Federal Chart 6D	29		
30	LABOUR RELATIONS	See Federal Chart 6D	30	LABOUR RELATIONS	See Provincial Chart 6
31	MANPOWER	See Federal Chart 6D	31		
32	PROCUREMENT	See Federal Chart 6E	32		
33	REGULATION OF TRADE	See Federal Chart 6E	33		
34	WATER	See Federal Chart 6E	34	WATER	See Provincial Chart 6
S1	COMMUNICATIONS	See Federal Chart S1A	S1	COMMUNICATIONS	See Provincial Chart 7
S2	DAMAGE DETERMINATION	See Federal Chart S1A	S2	DAMAGE DETERMINATION	Provincial Involvement Not Yet Identified
S3	LAW AND ORDER	See Federal Chart S1A	S3	LAW AND ORDER	See Provincial Chart 7
S4	POSTAL SERVICES	See Federal Chart S1B	S4		
S5	PROVINCIAL MANAGEMENT CONTROL	See Federal Chart S1B	S5	PROVINCIAL MANAGEMENT & CONTROL	See Provincial Chart 7
S6	TRANSPORTATION	See Federal Chart S1B & S1C	S6	TRANSPORTATION	See Provincial Chart 7
S7	VULNERABILITY ANALYSIS	See Federal Chart S1 B	S7		

Figure 1

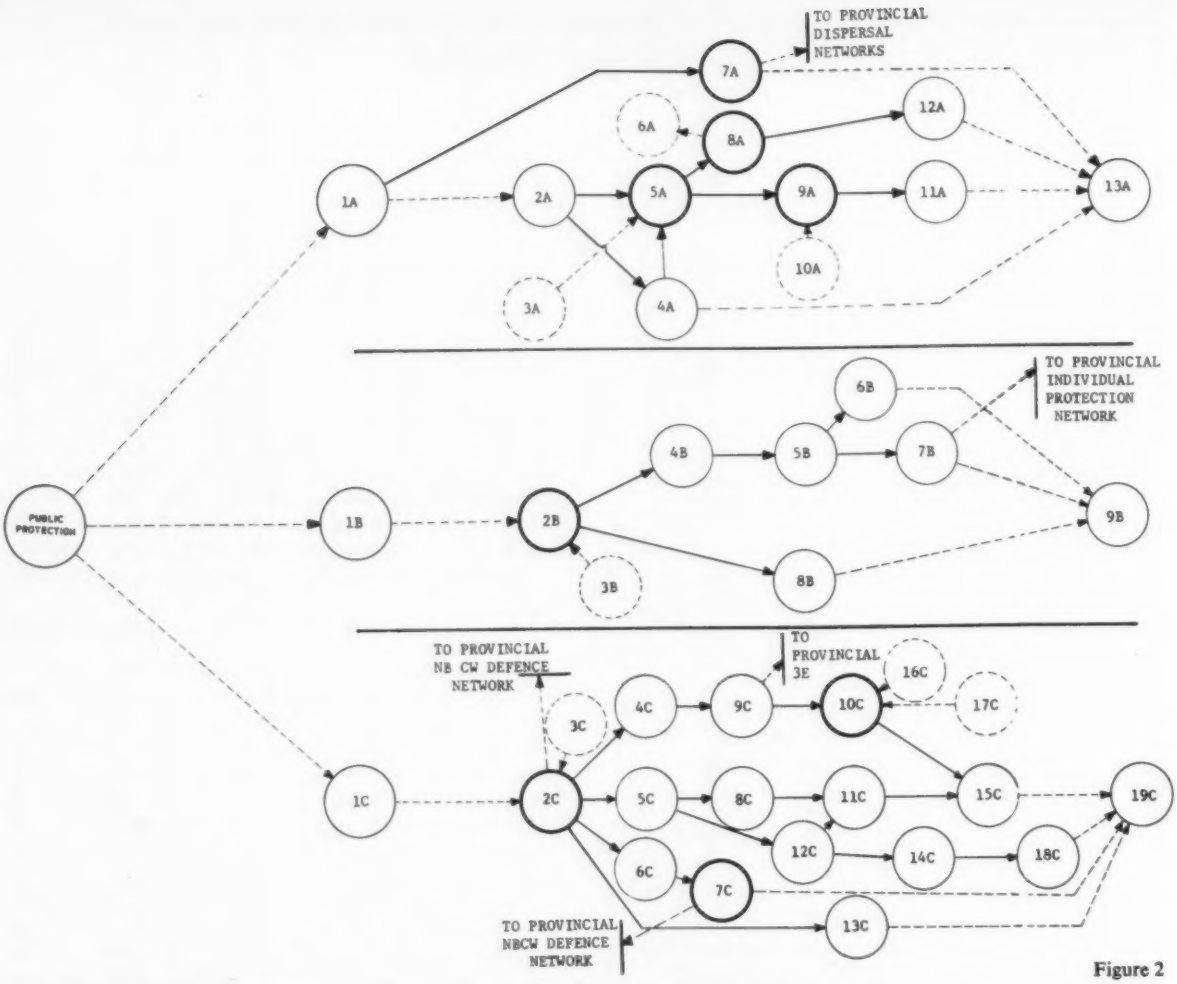


Figure 2

LEGEND

1 A DISPERSAL
2 A Activity Requirements Established
3 A Dependency — Activity S7, Event E
4 A Studies on Dispersal Methods Made and Results Implemented
5 A General Dispersal Control Plan Completed
6 A Dependency — Activity 10, Event D
7 A Federal Provincial Responsibilities for Dispersal Agreed
8 A Master Acommodation Requirements Plan Developed
9 A Master Transportation Requirements Plan Developed
10 A Dependency — Activity S6
11 A Evacuation Control Plans Developed
12 A Accommodation Inventory Completed
13 A Capability Achieved

1 B INDIVIDUAL PROTECTION
2 B Activity Requirement Established
3 B Dependency — Activity S7, Event B
4 B Pre-Emergency Measures for Individual Protection Identified
5 B Information Compiled and Printed
6 B Information Stored for Future Use
7 B Information Distributed to Provinces
8 B Studies to Improve Individual Protection Measures Conducted
9 B Capability Achieved

1 C NBCW DEFENCE
2 C Activity Requirement Established
3 C Dependency — Activity S7, Event E
4 C Equipment Selected and Evaluated
5 C Staff Requirements Co-ordinated with Provinces
6 C Reference and Training Manuals Prepared
7 C Manuals Issued to Provinces and Federal Departments
8 C Courses Prepared
9 C Equipment Specifications Prepared
10 C Equipment Procured and Distributed
11 C Personnel Trained
12 C Operating Procedures Prepared
13 C System Surveillance Maintained
14 C Plan Co-ordinated with USA and Others
15 C National Exercises Held
16 C Dependency — Activity S1, Event A
17 C Dependency — Activity 11
18 C International Exercises Held
19 C Capability Achieved

that comprises national civil emergency measures. Such an analysis, it was decided, must start right at the beginning, and examine the national objective for civil emergency planning and identify and describe, in the greatest possible detail, each emergency function which would contribute to the achievement of that objective. As each function or activity was identified, it became necessary to define it accurately and to provide it with a realistic goal. A goal, being an objective stated in quantitative terms, is a rather more precise way of indicating what it is that any given activity must accomplish. The sum total of these goals then represent the national capability to meet a war emergency, and it can be readily appreciated that these goals are inter-related for any given level of national capability. For example, if we set a goal of being able to rescue so many casualties, to the rescue activity, then we must also make sure that included in the goal for the Emergency Health Services activity is the ability to deal wtih the same number of casualties. Similarly, if continuity of government demands a certain number of emergency government headquarters, then the goal set for the communications activity must include the communications to service those headquarters. It is only when matters such as these are checked and cross-checked and appropriate adjustments made that we can say that we have a balanced capability.

How do we estimate that capability? Well, how does one estimate the capability of a motor tire? or a carpet? This is usually done by reproducing mechanically the stresses to which it will probably be exposed during a specified period of time and then measuring the results on the tire or carpet. Naturally, in testing our national capability, we can not reproduce physically the stresses imposed by nuclear war. The best we can do, from the basis of past tests, experience and scientific knowledge, is to estimate them on paper. Hence, just as one might use 10,000 passes of a certain machine over a strip of carpet to simulate the "attack" upon it by thousands of feet; so one can consider a plausible enemy attack pattern of so many megatons as a test of national capability. The effects on different carpets of 10,000 passes of the machine would give a basis for comparing the resistance to wear of the carpet, and in the same way the effects of the plausible attack gives us a method of estimating and comparing the effectiveness of various levels of capability.

After this process of analysis, commenced one of synthesis — putting together the component parts in a manner which would most readily adapt itself to the processing of planning, programming and budgeting, of coordination and of evaluation; all of which are essential to the running of any modern and dynamic program. The activities which had been identified were grouped together in six sub-programs, each of which forms a significant and readily definable part of the national program. These sub-programs are:

Public Protection
Public Information
Essential Societal Services
Continuity of Government
Essential Utilities and Special Services
Economic Planning and Resource Control

The next step was to prepare network diagrams for each of the six sub-programs. These are desirable in order to demonstrate graphically, how the various activities in each sub-program relate to, and depend upon each other and to indicate at what stage in the orderly movement of the sub-program towards its objective, various intermediate steps must be completed. Diagrams of this kind are of the greatest assistance to management in appreciating better the significance of its decisions. Interdependencies between sub-programs or, to put it another way the required contributions of activities in one sub-program to those in another were also identified and recorded. Our example is shown at Figure 2.

And so the two processes of analysis and synthesis went on for six long months until in June 1968 the Project Phoenix Report was submitted. It probably represents in terms of man-hours, one of the largest studies of civil emergency measures ever undertaken. There was a Chairman and Deputy Chairman to direct the project; there was a secretarait to maintain minutes of the almost daily meetings, to prepare papers for circulation and study, and to attend to the not inconsiderable amount of correspondence and communication on the project; and there was a project control officer who was responsible for keeping the project on time with respect to its own PERT diagram. Then there were two major groups —

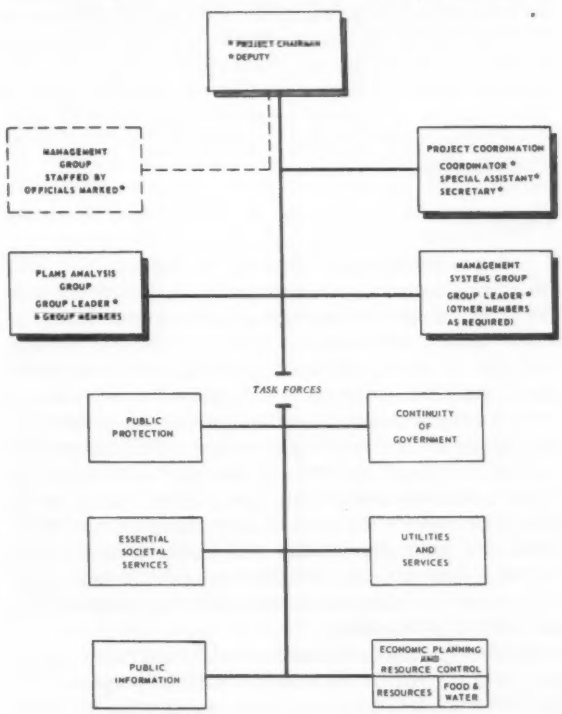


Figure 3

a Plans Analysis Group and a Management Systems Group, both of which were the focal point for studies as indicated by their titles. All the above were the full-time staff of the project, and were drawn mainly from Canada EMO although some important positions were filled by persons kindly assigned to the project by other federal departments. (Figure 3)

There were, in addition, six task groups formed corresponding to the six sub-programs. These were formed of representatives from departments and agencies responsible for the activities in each sub-program. The purpose of these groups was to prepare realistic, acceptable and consistent definitions, goals and network diagrams for the activities in each sub-program. A provincial input was ensured by running two major conferences with provincial officials and by the very considerable amount of work which provinces put into contributions which they prepared for the project Finally, there were many small meetings and consultations going on continually throughout and at some stage, or in some way, anyone with special knowledge relevant to the project objectives was consulted.

It is not possible in an article such as this to conduct the reader through all the processes which were followed in Project Phoenix. Let us, therefore, summarize the project by saying that it was an analytical planning study of civil emergency measures, the results of which were recommendations on: the program/activity structure of civil emergency planning for the next five years; the the methods by which policy in civil emergency measures should be formulated; how the complex network of activities should be coordinated so that each contributes its essential part to the national objective; and what procedures should be introduced in the area of financial management, so that the available funds may be allocated where they are most urgently required within the total program.

Impact

When something so complex as the national civil emergency measures program has to be guided towards the achievement of a national objective, there has to be a very large degree of cooperation and unity of purpose amongst all the participants. The national civil emergency measures program is unique in Canada because it is a program which is intended to incorporate the emergency of the federal government, of all the provincial and territorial governments, of every municipality in Canada, and of every Canadian civilian, be he in his public or private capacity. The procedures, therefore, which are necessary to guide this immense undertaking so that it has purpose, credibility and effectiveness, must be complex and demand the goodwill and understanding of all those participating.

To develop the understanding and cooperation necessary, and to provide the essential unity of purpose, Project Phoenix has suggested the introduction of more formalized planning procedures. Civil emergency measures reaches down into every part of the national structure, and yet for their development, both authority and responsibility are delegated to a series of departments and agencies, in federal, provincial and municipal governments. It is true that coordinating agencies exist at each of these levels, but nevertheless, there has been no requirement for all these participants to plan formally together. The Project Phoenix report recommends that they should be required to consult with each other more frequently and more directly with regard to the establishment of objectives, goals and priorities for the allocation of resources. It is believed that the six sub-programs lend themselves to the development of sub-program planning, programming and coordinating groups which might, in time, become management groups with the responsibility of reviewing and recommending collectively appropriate developments in each sub-program.

As the coordinating agency in all this, Canada EMO has the task of stimulating and leading this consultation and, because of its interest in the maintenance of balance and consistency throughout the program, of joining in direct consultation with all federal departments and agencies and with the provincial and territorial governments. The purpose of this dialogue will be, not only to maintain the program in a dynamic state of development, but also to reach agreement on priorities and objectives which, it must be expected will vary region by region, and department by department.

Evalution of the program is likely to become a function which will be welcomed by all managers within it. At a time when resources are strictly limited, it is most helpful to have regular assessments of the efficiency and effectiveness of measures under way, so that following a process of adjustment better results may be obtained for the same outlay.

The advent of planning, programming and budgeting into federal government management will make itself felt by all those concerned with the development of civil emergency measures. Project Phoenix has indicated how this may be applied and there is almost certain to be increased emphasis on the relationship of resources to the achievement of objectives on the time scale for such achievement and on the relative importance and urgency of various measures. In short, it appears that we are about to launch ourselves into an era of constructive analysis and cooperative programming in which the communication of ideas between all civil emergency planners must receive a great deal of attention not only to ensure that it takes place but also ensure that the idea communicated is the idea received.

Specific recommendations arising out of Project Phoenix which, it is hoped, will pave the way for the new procedures, are at the time of writing under review by federal departments and provincial authorities. When finalized and approved, they should constitute a prominent milestone in the development of civil emergency measures.

(*Continued on page 11*) **PROJECT PHOENIX**

GOVERNMENT IN WAR

by

C. W. Bunting
Chief, Emergency Government Operations Division
Canada Emergency Measures Organization

Universal experience in disasters such as earthquakes, hurricanes, floods and the effects of conventional war on the civilian population in which there has been severe loss of life and property damage has pointed up the need for quick and decisive government action to alleviate the suffering of the population, reduce property loss and re-establish, as quickly as possible, an orderly community. Realistic experience in reaction of the population to a nuclear war is not available. It is reasonable to assume however that because of the magnitude of the destruction and loss of life in chaotic conditions brought about by nuclear attack, the need for government leadership and direction would be greatly multiplied.

In a nuclear war, there would be a threat to Canada from the direct effects of enemy nuclear weapon attacks on specific areas, and from radioactive fallout of varying intensity over widespread areas of the country. In the light of this threat, it is expedient to provide a capability for governments at all levels to function effectively.

The different levels of government in Canada would not all be concerned with the same problems during the initial stages of a war emergency. At the federal level, the government would likely be occupied with a wide range of national problems, such as the mobilization and management of the resources of the country for war, the prosecution of the war, and national financial policies. In this regard it is recognized that federal departments and agencies would participate to varying degrees in the survival of the nation after an attack with nuclear weapons. Certain departments would have emergency functions to perform immediately at the commencement of an emergency while others, because of the nature of their peacetime responsibilities, could, if necessary, suspend normal departmental operations until the situation became more stabilized in the recovery period.

In moving from the federal government through the provincial level to the municipality, the character of operation would alter. Provincial Governments would be closely associated with the survival of the population through their relationships with municipal governments, and through their traditional responsibilities for health, welfare, highways, road transport, law and order and so forth. Municipal governments on the other hand generally would be the operational front insofar as the survival of the population is concerned, and as such, would be concerned primarily with the civil defence aspects of emergency measures, such as the rescue of trapped people, firefighting, restoration of municipal services, direct medical aid, hospitalization, welfare aid, evacuation and relocation of the population.

It will be seen that government on a continuing basis at all levels, would be vital to the survival of the country. However because of the possible destruction of government centres and the disruption of activities through radioactive fallout, these operations would not be possible unless special arrangements are provided which would allow governments to continue to function under attack conditions.

A concept for the continuity of government in a nuclear war was first expressed in a statement made by the Prime Minister of Canada in the House of Commons on August 21, 1958 (Hansard, Volume 102, Number 79, page 3866):

> ". . . having regard to the vulnerability of our communications and transportation facilities, the normal peacetime arrangements for government would be inadequate in the event of a major war. There is need, therefore, in our opinion, for the development of a decentralized federal system of emergency government with central, regional and some zonal elements."

In accordance with this concept plans for the continuity of government are based on a pre-determined grouping of central, regional, zonal and local or municipal elements through which the most essential functions of government will be conducted. In general, the purpose of such an organization, with all its associated facilities, is to make it possible for governments to operate on a decentralized basis with a high probability that they will be able to assume effective operational control of the country under nuclear attack conditions.

The effectiveness of these plans is contigent on the steps taken by federal, provincial and municipal governments to provide a capability to function during the war period. It is evident that this capability must be designed to withstand, to the greatest possible extent, interference from the effects of enemy attack. There also must be an immediate availability of authority to cope with emergency situations that will arise. To achieve these aims, the following steps are necessary:

—Governments located in areas where there is a high risk of direct enemy attack must be relocated to safer areas.

—Governments and relocated governments located in areas which might be subjected to radioactive fallout must be provided with accommodation

with protection from radiation. The degree of protection afforded should be commensurate with the estimated degree of risk for the area.

—Lines of succession for senior elected officials and government officers must be established.

—Essential government records must be selected and stored in safe locations.

—Authority provided under the War Measures Act and provincial emergency measures legislation respecting measures for the survival of the population and the prosecution of the war must be readily available to government elements at the commencement of the emergency.

The Plan

The relocation of government will be achieved through the establishment of emergency operating centres at the federal, provincial, zonal and local or municipal levels of government. Groups of elected officials and government employees charged with emergency assignments will be located in these centres at the outbreak of hostilities.

The decentralization of authority will be attained through delegation:

—The emergency powers provided federal ministers by the War Measures Act and related Orders in Council and Regulations respecting the survival of the population and the management of the nation's resources, may be delegated by a Minister to federal government representatives at all levels.

—Regional Commissioners, who will be appointed by the Governor General in Council, will assume powers of the federal government, including those powers provided through the War Measures Act and related Orders in Council and Regulations as must be used to deal with the emergency situation existing in a province when communications with the federal government are not available.

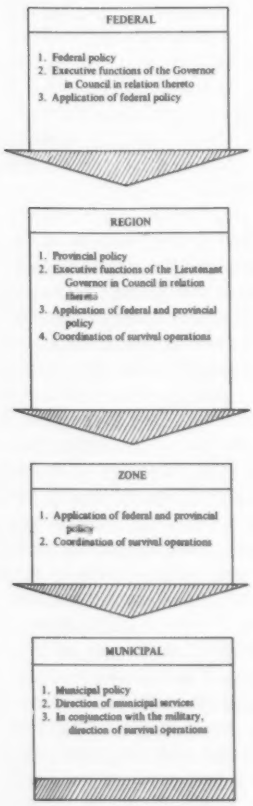
It is anticipated that provisions would be made for the decentralization of provincial authority through delegation.

Emergency Powers

The authority for action by the federal government, with respect to most matters of an emergency nature concerning the survival of the population and the prosecution of the war, will be found in the provisions of the War Measures Act. This Act enables the Governor General in Council to take any action which, by reason of the existence of real or apprehended war (invasion or insurrection), is considered necessary or advisable for the security, defence, peace, order and welfare of Canada. The War Measures Act would come into force only upon the issue of a proclamation by the Governor General in Council declaring that a state of war exists.

Provincial governments also have enacted legislation covering emergency measures. These acts, with certain

RELATIONSHIP OF GOVERNMENTS IN A WAR EMERGENCY


FEDERAL
1. Federal policy
2. Executive functions of the Governor in Council in relation thereto
3. Application of federal policy
REGION
1. Provincial policy
2. Executive functions of the Lieutenant Governor in Council in relation thereto
3. Application of federal and provincial policy
4. Coordination of survival operations
ZONE
1. Application of federal and provincial policy
2. Coordination of survival operations
MUNICIPAL
1. Municipal policy
2. Direction of municipal services
3. In conjunction with the military, direction of survival operations

exceptions, generally provide either the Lieutenant Governor in Council, or the minister responsible for emergency measures, with authority, on declaration by the Lieutenant Governor in Council that a state of emergency exists in the province, for putting into effect the measures deemed necessary to support the relief of suffering by the population.

Federal, provincial and municipal acts, orders in council and by-laws provide governments with emergency powers and emergency planning authority. The principles of these authoritative references are briefly described hereunder.

—*Civil Emergency Measures Planning Order (Order in Council PC 1965-1041) (As amended by Orders in Council PC 1968-1302 and PC 1968-1580)* A federal order in council that specifies the civil emergency powers, duties and function of federal ministers of departments and agencies with emergency responsibilities and provides for the making of such preparations within those departments and agencies as are required to enable the minister to exercise his emergency powers, duties and functions in a war emergency.

—*The War Measures Act (RSc 206 sl) (as amended by the Bill of Rights, Part II, Section 6)*
An act to confer cetrain powers upon the Governor General in Council in the event of war, invasion or insurrection, as deemed necessary or advisable for the security, defence, peace, order and welfare of Canada. The War Measures Act will come into force only upon the issue of a proclamation by the Governor General in Council declaring that war, invasion or insurrection exists.

—*Emergency Orders in Council and Regulations (EMORs)*
Emergency orders in council with their supporting regulations will provide the government with additional authority under the War Measures Act to allow ministers to carry out those civil emergency powers, duties and functions referred to in Order in Council PC 1965-1041. The emergency orders in council will be approved by the Governor General in Council, as required, under the authority of the War Measures Act only after the act has been brought into force.

—*Administrative or Ministerial Orders*
Administrative or ministerial orders will be issued at the time of the emergency by the authority named in departmental emergency orders in council as a means of implementing the requirements of the regulations to the orders.

—*Provincial Emergency Measures Legislation*

Newfoundland	— The Emergency Measures Act, 1962
Nova Scotia	— The Civil Defence Act, 1958
New Brunswick	— The Civil Defence Act, 1955
Prince Edward Island	— The Civil Defence and Disasters Act, 1959
Quebec	— Legislative Assembly of Quebec Bill No. 73-1951
Ontario	— The Emergency Measures Act, 1962-63
Manitoba	— The Civil Defence Act, 1954
Saskatchewan	— The Civil Defence Act, 1963
Alberta	— The Civil Defence and Disasters Act, 1955
British Columbia	— The Civil Defence Act, 1960

—*Territories Emergency Measures Legislation*

The Northwest Territories	— Civil Emergency Measures Ordinance 1966 (2nd) C. 3
The Yukon Territories	— Civil Emergency Measures Ordinance 1966 (2nd) C. 3

—*Provincial Emergency Orders and Regulations*
Provincial governments are encouraged to draft orders in council with supporting regulations to provide provincial departments and agencies with any additional authority which might be required to enable them to carry out their civil emergency powers, duties and functions. The orders in council would be approved by the Lieutenant Governor in Council under the authority of appropriate provincial legislation.

—*Municipal By-Laws*
Municipalities should have enacted by-laws which define civil emergency planning within a municipality, explain the aims of the municipal organization, and outline the responsibilities of departments and agencies of municipal governments for emergency planning in peacetime.

Relocation of Government

A complex of central emergency government facilities has been developed in the Ottawa area in which will be located government policy-making groups, consisting of elements of the federal government executive, senior civil advisers drawn from departments and agencies with essential emergency functions, and senior military advisers. Additional elements of the federal departments and agencies will provide operational assistance and technical advice.

Regional Emergency Government Headquarters (REGHQ) will be established in each region, the boundaries of a region corresponding precisely with those of the province. Located in each REGHQ will be a Regional Commissioner, a provincial government executive group, senior officials of the provincial government representing departments and agencies with essential emergency functions, civil and military elements of the federal government drawn from departmental district offices and the senior military headquarters in the province.

There will be one or more satellite relocation units in support of each REGHQ. These units, consisting of personnel from the provincial and federal departments and agencies with representation in the REGHQ, will provide operational assistance and technical advice to the REGHQ, undertake special tasks beyond the capabilities of the REGHQ, and carry out such staff support to the REGHQ as may be necessary and possible in the light of the prevailing circumstances.

A Zone Emergency Government Headquarters (ZEGHQ) will be established in each zone. A zone is defined as an area within a region comprised of an aggregation of basic peacetime administrative areas, such as municipalities, counties, town sites or census divisions. All regions, with the exception of Saskatchewan, Prince Edward Island and Newfoundland, have been subdivided into two or more zones. Relocated in each zone will be a Zone Commissioner (who, in many cases, will be a provincial cabinet minister) and small elements representing operational departments and agencies of the federal and provincial governments.

Relocation groups for the ZEGHQ comparable to the regional relocation units will not be established in pro-

tected accommodation. However, some departments and agencies may find it necessary to establish supporting elements or local field offices in the general area of the ZEGHQ to ensure an additional operational capability for their zone staffs.

Municipal Emergency Government Headquarters (MEGHQ) should be established under provincial arrangements by each municipality or groupings of municipalities. MEGHQs of municipalities likely to be target areas will be located far enough away to be free from the effects of blast. For municipalities not in possible target areas, MEGHQs may be positioned near or in the seat of civic government.

Relocated in the MEGHQ will be an executive group comprised of the Mayor (or other head of government), selected members of the municipal civil emergency executive or control committee, and representatives of the various municipal services which would be concerned with survival operations, such as fire, police, health and welfare.

Functions of Governments in a War Emergency

The functions of governments at all levels in a war emergency are threefold:

—To provide coordination and direction in the carrying out of operations associated with the survival of the population from the effects of enemy attack.

—To provide policy direction, coordination and leadership in the fields in which a government is constitutionally responsible.

—To provide for the management of the nation's resources.

At the federal level, the government will continue to give direction in all areas constitutionally the responsibility of the Government of Canada. In addition, there will be a need to establish policy in connection with the mobilization of the country for war, direct the prosecution of the war, and establish national policies regarding the survival and recovery of the population and management of the country's resources.

At the regional level, both federal and provincial government functions will be performed at an REGHQ:

—A provincial government will continue to give executive direction to its departments and agencies in areas that are constitutionally the responsibility of the provincial government. It will also establish provincial policy and coordinate and give direction covering survival operations within the province.

—The federal government elements will be responsible for implementing the measures required to give effect to policies of the federal government.

In a zone, the ZEGHQ will be the centre of authority for the coordination of activities immediately following attack.

The ZEGHQ staff will give required direction to municipalities located within the zone; coordinate federal and provincial departmental activities within the zone in support of municipalities needing assistance, especially in the establishment of priorities where requirements conflict; provide support to army rescue operations; provide situation reports to the REGHQ and implement any direction received from that source.

In the municipality, the municipal government under the Mayor or Reeve, will continue to exercise its vested authority. In addition, it will be responsible for the control and direction of all civil survival operations directed towards the survival of the population and the restoration and rehabilitation of the community during a period of emergency.

The relationship of decentralized governments in national survival is shown in diagramatic form at Plate I.

Flow of Information

A capability will exist at operations centres of the federal government, at each REGHQ and each ZEGHQ and at MEGHQs for gathering, analysing and disseminating information and intelligence concerning enemy attacks, bomb damage, fallout (Radiological Defence)*, resources, casualties and other information that might be required by governments. There also will be capability to originate broadcasts of advice and information to the public from the central and regional emergency facilities. These broadcasts will be carried by all radio stations in Canada over an emergency broadcasting network.

Responsibilities of Governments in a War Emergency

The basic principle has been applied that each level of government will continue to be responsible in an emergency for the statutory functions that it normally performs in peacetime. The wartime responsibilities of the federal, provincial and municipal governments have been published in a Canadian EMO pamphlet entitled "Civil Emergency Planning".

Communications

The Department of National Defence will provide communications for the federal government in a war emergency.

A system of communications connects the central emergency government facilities to each Regional Emergency Government Headquarters. Each REGHQ will be connected to its associated relocation units and the Zone Emergency Government Headquarters located within the region.

The system consists of a private wire network of leased commercial telephone and telegraph circuits between major areas. In addition, for the overflow of government

*A. H. Blake — Radiological Defence in Canada EMO Digest Vol. 8, No. 5.

traffic, connections will be available through normal toll facilities of commercial telephone and telegraph companies. A radio teletype system between central emergency government facilities and REGHQs is also provided.

The services of the federal emergency communications system will be made available to provincial governments. In addition, provincial governments will arrange links into their provincial radio systems which will provide radio communications between REGHQs, ZEGHQs and provincial government elements at the municipal level.

Municipal communications will consist of the normal commercial telephone system augmented by the municipal fire, police and other radio telephone networks.

Conclusion

The timing for the activation of plans for relocation of government in a threatening war emergency would be difficult to establish and could be influenced by many factors. It is now generally agreed that in a deteriorating international situation which threatens world peace there is likely to be a defined period of tension before war actually develops. In other words, the outbreak of war is not likely to be a "bolt from the blue".

This strategic period of warning might terminate in three ways. Peace could prevail; a local conventional war could break out; or, through an escalation of events full-scale world war could develop involving the detonation of nuclear weapons on the North American continent. Should the latter come about all Canadians would be directly affected.

Full advantage must be taken of any strategic warning time, even though it might not be certain at that time whether war would actually develop. In such a situation readiness plans for the continuity of government and the survival of the Canadian population must be capable of being fully implemented and emergency government operating centres placed in full operational states of readiness so that elements of governments could be quickly relocated.

The full potential of the wartime functions of governments will be established, however, until a federal government decision is reached regarding the bringing into force of the War Measures Act, thus providing it with the additional executive authority it would require to prosecute the war and direct the survival of the nation. Regardless of preparatory actions by governments in time of strategic warning prior to attack, timing of the bringing into force of the War Measures Act will vitally affect the ability of Canada and Canadians to survive.▲

PROJECT PHOENIX (*Continued from page 6*)

Conclusion

Project Phoenix was unique, because the National Civil Emergency Measures Program is unique. Being so, it may serve as a model for planning and management studies of other programs having complex structures and autonomous participants. However, its real achievement has been to point the way towards unity and cohesiveness in civil emergency planning, towards purpose and credibility and towards consistency and balance. Nevertheless, planning is a process of evolution. In a constantly changing environment a plan or study commences its obsolescence when it is finalized. The way ahead to which it has pointed becomes the focal point of new study while the methods of climbing the hills and avoiding the obstacles on it become matters of moment. Nevertheless, every worthwhile study not only contributes to the overall field of knowledge but also provides management with some of the tools and some of the procedures for tackling the problems which lie along the way ahead. Project Phoenix, we believe, has been such a study and one which it is hoped will assist those engaged in civil emergency measures to meet the problems of the next five years or so with more confidence and more precision. Consequently, we believe that our selection of a title for the project was quite apt, although it is to be hoped that in a dynamic environment of emergency planning, the cycle from worm to cremation of the Phoenix will not be permitted to extend to 1460 years!▲

FALLOUT PROTECTION PLANNING

by

K. G. Farrell
Chief, Fallout Protection,
Canada Emergency Measures Organization.

I - Introduction

On March 1, 1954 an event took place that was to change the thinking of defence experts throughout the world, an event which dramatically unveiled another and most significant dimension in the problem of national defence.

The event was the historic Rongelap episode where a high yield thermonuclear weapon was detonated on a reef near the Bikini Atoll in the Marshall Islands. Gamma radiation doses from the radioactive fallout, as high as 3,300 roentgens in the open, over a period of four days were recorded a hundred miles from ground zero on the Rongelap Atoll. Prior to this, it was thought that high yield surface detonations would produce intense fallout only in the immediate vicinity of the explosion and that most of the radioactivity would be carried into the stratosphere to be scattered widely around the world, falling out weeks or even months later.

And so the skeleton in the nuclear closet made its appearance, etching in the minds of the discerning, the magnitude of the hazard of fallout radiation. Here indeed was a hazard with which no country had been faced, up to that time. Without adequate protection it was a killer. Though invisible, without form, with no smell and no taste, it could cause immediate biological injury and death within a few hours. How then could people be protected from this unseen killer?

This was obviously a question for the scientists. The history of biological damage by ionizing radiations is almost as old as the history of X-rays. The first such case was reported in July 1896, within a few months of their discovery by Roentgen, and two years before radium had been separated in a pure state by the Curies.

Knowledge of the characteristics of ionizing radiation accumulated rapidly during the next few years, but mostly on radiation from point or other controlled sources. The problem itself in 1954 involved the penetration of gamma radiation in air and limited barriers from plane sources rather than from the simpler point sources. It was in fact how to provide effective shielding against the plane sources of ionizing gamma radiation, a problem which had never risen before and, therefore, one which had yet to be solved.

In 1956, Dr. L. V. Spencer headed a group at the National Bureau of Standards to examine this problem, namely the penetration of gamma radiation from plane sources.

By this time electronic computers had developed to the stage that permitted analytical work that was hitherto impossible because of the tremendous amount of calculation necessary. Spencer's work led to the development of a method for determining the penetration of radiation into thick shields and constitutes the scientific basis for the majority of shielding methods in use today.

Having arrived at a method by which protection from fallout could be designed and assessed its practical application and the implementation of any scheme to provide fallout protection for millions of people was and still is a major undertaking. The purpose of this article is to provide an outline of what has been done in the fallout shelter planning field in Canada, and what is going on now and what is required for the future.

II - Why Fallout Protection

The Problem

The probability of a nuclear exchange involving the North American Continent during the next ten years is rather difficult to determine. The number of variables and the complexity of their interrelationship make it almost impossible to arrive at any numbers that would be useful for planning purposes. But, even without such numbers, a brief look at international developments of the last fifteen years shows quite clearly how the threat of nuclear devastation has developed and increased. The fact that the world has survived three major crises in seven years has created an extremely dangerous attitude of complacency about the probability of nuclear war.

The two super powers, Russia and the United States, each maintain an assured deterrent in the face of a sudden major attack by the other, but there are other nations that have joined the nuclear weapons club during the

last two or three years. Britain, France and Red China already have, or are on the point of having, some intercontinental strike capability and there are a number of others that could develop such capabilities by the 1970's, if they chose to do so.

Proliferation of nuclear weapons and the continued build-up of nuclear arsenals all tend to continue the possibility of a nuclear exchange. Although the probability of nuclear war may be small, it is not so small that it can be ignored.

Any attack on Canada would most likely be part of a much larger attack on the United States and even if Canada were ignored, it could still be affected by fallout, as well as by missiles that may fall short of their target. The problem, therefore, is to provide the people of Canada, in an emergency, with the maximum possible protection against the effects of nuclear attack. In as much as we in civil emergency planning have to be concerned with all the effects the basis for planning of protection must be based on a prudent assessment of the probabilities of direct attack and/or fallout.

III - Shelter Planning in Canada

1. In Review

From the earliest days of civil defence in the nuclear context to the more sophisticated approach of total civil emergency planning of today, philosophies have varied to meet the effects of changing technology. The threat has moved from the manned bomber delivery system to the more effective ballistic missile method. Nuclear arsenals have grown to considerable proportions, the magnitude of the threat has increased. During the period of predominantly manned bomber type of threat, heavy emphasis was placed on evacuation from likely target areas, but with the advent of intercontinental ballistic missiles, this emphasis was reduced on the basis that there would be only fifteen minutes in which to take cover. But since the attractiveness of strategic surprise has diminished very considerably over the last few years, the mix options for public protection has increased.

But, despite these changes, the purpose and objectives of fallout shelter planning in Canada have never changed, and are as valid today as they were in 1959. The tactics may have varied somewhat, but the strategy remains the same. The purpose of the National Fallout Shelter Program in Canada is to save life and reduce casualties in the event of nuclear exchange involving North America. Its ultimate objective is to provide fallout shelter for the public and in moving towards this objective, the first step has been taken with the examination of existing available potential fallout shelter spaces in all parts of Canada.

How far have we advanced towards achievement of the objective? To answer this, let us first examine a few of the events that have taken place in the past ten years.

Late in 1959, a pilot fallout protection survey of the City of Brockville was carried out as a joint federal-provincial-municipal project and its objective was to develop a method of surveying and evaluating the fallout protection immediately available in various buildings of a typical city in the population range of 15,000 to 20,000. The survey approach used was that given in the United States Office of Civil Defence and Mobilization provisional document, "Fallout Shelter—Guide for Architects and Engineers", but the method of calculation was based on a method developed by the United Kingdom Home Office. This was the first, and hence very significant, step taken by Canada in attempting to find out what problems were involved in developing a national inventory of fallout protection. The experience and conclusions of this study contributed significantly to the shape of future surveys, but it was quite apparent that we had a long way to go before being in a position to embark on a nationwide survey.

Stimulated by the Berlin crisis of 1961, the Government of Canada decided to examine and evaluate the potential fallout protection in the basements of all federal buildings throughout the country. This work was carried out by the Department of Public Works of Canada on behalf of the federal EMO. Buildings under the control of the Department of National Defence were surveyed and evaluated by DND personnel. As a result of this action by the federal government, many of the provincial governments also carried out studies of provincial buildings and it was about this time that many municipalities, particularly those in Ontario, initiated fallout protection surveys themselves. Recognizing that the mines of Canada also offered tremendous potential as shelter, a very thorough study of these was made by the Department of Mines and Technical Surveys in 1962, to determine whether in fact they could be used and if so, what would be the requirements for utilization. Generally most mines could be used as long as auxiliary power were made available for the necessary ventilation and for access and egress.

The pilot survey of the Province of Alberta, carried out during the summer of 1964, by the Department of Public Works of Canada, with the close cooperation of Alberta, proved to be very effective. Its primary aim was to develop techniques of fallout protection survey which could be applied to a national survey, with a secondary aim of determining the amount of fallout protection that could be made available for public use. Both of these aims were achieved. Although only surveys have been mentioned up to this point, some effort has been expended in studies, reasearch and development in such areas as emergency ventilation, shielding analysis techniques, sewage disposal systems, emergency power sources, and special design studies.

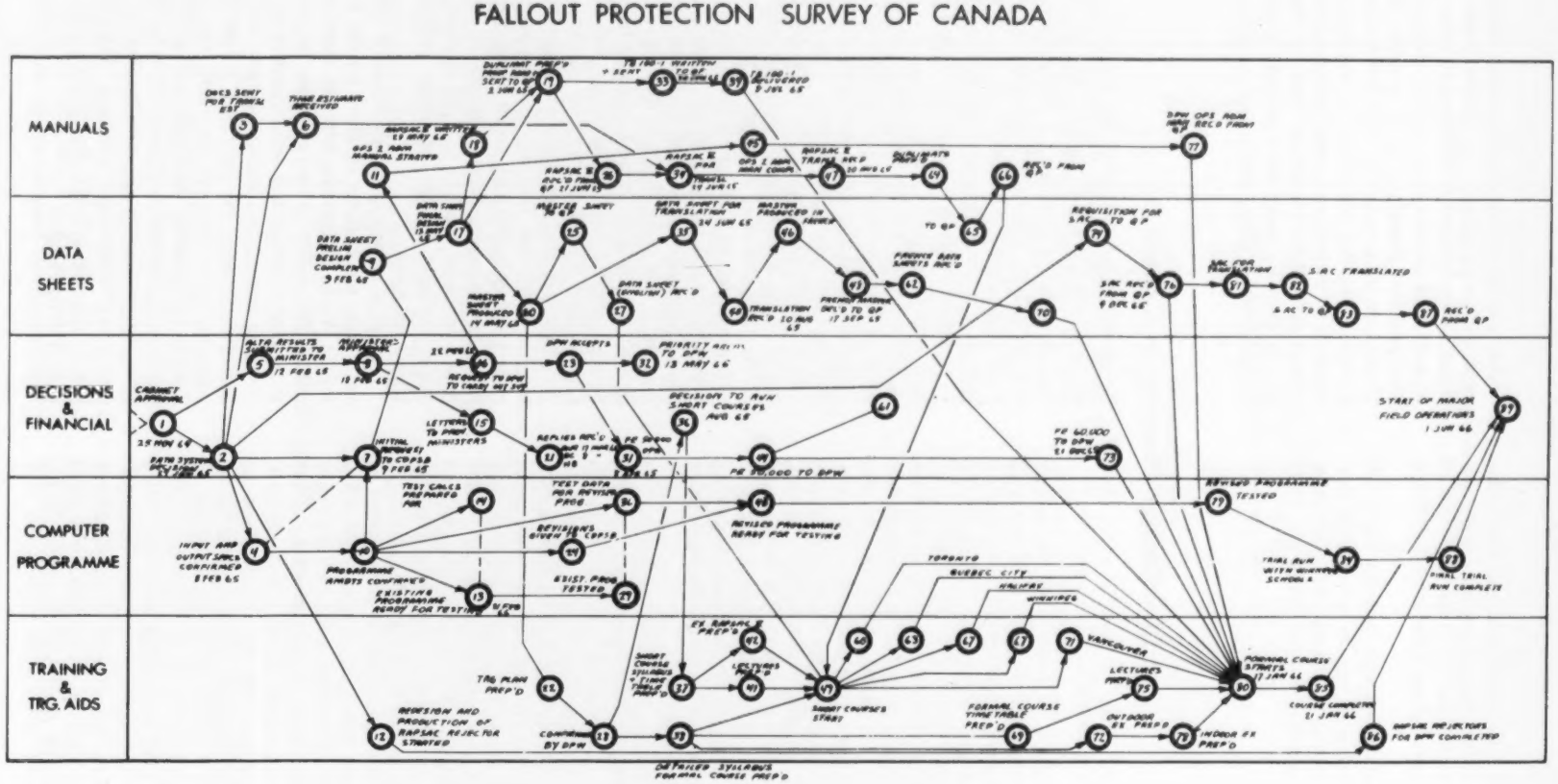


Figure 1. Canada EMO Planning Network

Before trying to judge how far we have advanced towards achievement of the objective of providing fallout shelter for the public, a brief look at the Fallout Protection Survey of Canada is essential since it constitutes the most significant single operation carried out under the present authorized program.

2. Fallout Protection Survey of Canada

The Government of Canada approved commencement of a nation-wide survey of fallout protection on 18th February 1965. Its purpose was to determine, throughout Canada, the amount of existing potential fallout protection, in terms of numbers of shelter spaces and levels of protection, that might be made available for use by the public in an emergency. The survey covered all buildings, public and private except domestic dwellings generally, although large apartment blocks were included. Technical planning for the project was carried out by Canada EMO, but the field operations, including their planning and organization, were carried out by the Department of Public Works of Canada on behalf of Canada EMO. Additionally, the full cooperation of provincial and municipal governments and private industry was received, without which, the project could never have been satisfactorily implemented. Data processing is being carried out by the government Central Data Processing Service Bureau in Ottawa.

From a national point of view, Canada EMO is the responsible agency for recommending public protection policy and programs to the government, and for recommending appropriate courses of action for policy programs. Within this framewok it is responsible for assessing intelligence estimates and conducting vulnerability studies with respect to shelter requirements, determining methods of providing protection, directing adoption of techniques that shall be used to assess and evaluate shelter and for the necessary supporting research and development.

The Department of Public Works of Canada has undertaken substantial and steadily increasing commitments since 1961 in the field of civil emergency planning and, as with previous surveys, it planned for, organized and carried out the field survey operations portion of this project in all provinces except Saskatchewan. Saskatchewan was surveyed by the University of Saskatchewan in 1967 under contract to the Department of Public

Department of Public Works
Regional Emergenecy Planning Officers
1966

Figure 2

Standing			
L. to R.	D. R. Halstead (Ont.)	C. J. Main (Man.)	B. M. Byrne (Sask.)
	I. MacInnis (N.S.)	D. P. Dodge (B.C.)	M. H. Stout (Alta.)
Seated			
L. to R.	J. B. Delage (Que.)	R. D. Donnelly (P.E.I.)	L. Harriott (N.B.)
	A. W. Oke (NFLD.)		

Works. Apart from the planning, administration and control of field survey operations, DPW of Canada also agreed to develop and implement, in conjunction with provinces and territories, the associated public relations program. The Central Data Processing Service Bureau agreed to carry out or arrange for processing of the field data, computing and printing out results. This represents a very brief resumé of the agreed responsibilities of each of the principal participating federal agencies.

Planning, operations and data processing for this project have taken four years to complete from the date of authorization early in 1965. Initially, it was envisaged that the work could be finished in three years, but budget allocations necessitated an expansion of the time period, pushing completion towards the end of the 1968 fiscal year. It should be mentioned here that all provinces, except Quebec and Ontario were, in fact, completed about one year ago and final results distributed very soon afterwards. Quebec and Ontario, each having many more buildings than other provinces, could not be completed at the same time as the other provinces with available resources and, therefore,, required a further summer to complete. The network diagram shown in figure... covers the Canada EMO planning steps up to commencement of the major field operations, but does not include any of the complex planning carried out by the Department of Public Works in Canada.

One of the most important contributions to the successful completion of this project was the careful specialized training given to all key personnel and the rigorous on-the-job training given the survey teams. Training was another responsibility of the Department of Public Works of Canada. Short two-day orientation courses were held in Toronto, Quebec City, Halifax, Winnipeg and Vancouver for key personnel, during the latter part of 1965 as a preliminary round in the total training program, which enabled them to carry out more effectively their part of the planning for field operations. These were followed by a formal course at the Canadian Emergency Measures College at Arnprior, Ontario, on the 17th January, 1966. Material covered included nuclear weapons effects, shielding analysis techniques, public relations, survey methods of fallout protection as well as organization and administration. The DPW Regional Emergency Planning Officers shown in the group photograph, (Figure 2) were among those people attending the course, with the balance being Area Survey Officers and Group Leaders. The survey teams were

CANADA EMERGENCY MEASURES ORGANISATION - FALLOUT PROTECTION SURVEY DEPARTMENT OF PUBLIC WORKS OF CANADA.

BUILDINGS FOR SUMMARY: - MAR 1968 PROVINCE 7 ZONE 1 SUBZONE 199

****

BUILDING NUMBER 1314

KENOLL NUMBER 7 1 199 1 2 01314 UTM COORDINATES 11 705 5658 PARTS= 7 STOREYS= 4 COLONEL BELCHER HOSP PT D 12 AVE-4 ST SW CALGAR

PEAK OCCUPANTS 100 GAS POWER HYDRO AUX - 0 WATER CITY SANITATION CITY VENTILATION MECHANICAL

STOREY	WALL A	WALL B	WALL C	WALL D	CEILING	REDUCTION FACTOR	PC	AREA	S-AREA	C-AREA	VOLUME	XMA	XMB	XMC	XMD	XCL
1	0.022	0.005	0.018	0.0	0.001	0.045	3	7749	3874	0	38740	0	105	83	0	0
2	0.030	0.005	0.009	0.0	0.003	0.046	3	7749	3874	0	46488					
3	0.015	0.004	0.012	0.0	0.016	0.047	3	7749	3874		46488					
4	0.009	0.003	0.010	0.0	0.104	0.126	1	7749	3874		46488					

****

BUILDING NUMBER 1316

KENOLL NUMBER 7 1 199 1 2 01316 UTM COORDINATES 11 705 5658 PARTS= 7 STOREYS= 6 COLONEL BELCHER HOSP PT F 12 AVE-4 ST SW CALGAR

PEAK OCCUPANTS 160 GAS POWER HYDRO AUX - 0 WATER CITY&SEP SANITATION CITY VENTILATION MECHANICAL

STOREY	WALL A	WALL B	WALL C	WALL D	CEILING	REDUCTION FACTOR	PC	AREA	S-AREA	C-AREA	VOLUME	XMA	XMB	XMC	XMD	XCL
-1						0.000	8									0
0	0.0	0.000	0.0	0.0	0.000	0.001	8	3711	3711		37110	0	0	0	0	0
1	0.010	0.003	0.0	0.013	0.000	0.026	3	4640	2320	0	25520	54	57	0	104	0
2	0.003	0.000	0.0	0.015	0.000	0.018	4	4640	2320	0	25520					
3	0.003	0.000	0.0	0.011	0.000	0.014	4	4640	2320		25520					
4	0.002	0.016	0.0	0.009	0.001	0.027	3	4640	2320		25520					
5	0.002	0.009	0.0	0.008	0.005	0.023	3	4640	2320		25520					
6	0.001	0.007	0.0	0.007	0.034	0.049	3	4640	2320		25520					

****

BUILDING NUMBER 1317

KENOLL NUMBER 7 1 199 1 2 01317 UTM COORDINATES 11 705 5658 PARTS= 7 STOREYS= 1 COLONEL BELCHER HOSP PT G 12 AVE-4 ST SW CALGAR

PEAK OCCUPANTS 20 GAS POWER HYDRO-AUX 56-115KW WATER CITY&SEP SANITATION CITY VENTILATION MECHANICAL

STOREY	WALL A	WALL B	WALL C	WALL D	CEILING	REDUCTION FACTOR	PC	AREA	S-AREA	C-AREA	VOLUME	XMA	XMB	XMC	XMD	XCL
0	0.0	0.0	0.0	0.0	0.005	0.005	6	851	851		4808	0	0	0	0	0
1	0.001	0.0	0.0	0.000	0.033	0.035	3	2838	1419	0	18447	3	0	0	0	205

****

Figure 3. Typical printout of survey results.

made up of university students and received their preliminary and in-job training from the group trained at Arnprior.

The survey system used in the national project differed somewhat from that used for the Alberta survey. The main changes involved the field data collection sheet and the computer program. A mark-sense type of data sheet was used in the Albetra survey, which required considerable time in the field to complete and since the major expenditures for any fallout protection survey result from the field operation, it was absolutely essential that the time required to complete each data sheet be kept to a minimum. The mark-sense data sheet was also quite difficult to check and so a simpler sheet was designed and put into operational use for the national surveys. The information entered on each data collection sheet and submitted for data processing was key punched on the seven standard Electronic Data Processing cards and then transferred to tape ready for computer input. A number of major revisions were made to the computer program that was used for the Alberta survey, up-dating it considerably and sophisticating certain of its operations, but retaining the same simplified method of protection factor calculation.

Final results of the survey produced on six-part multicoloured paper, were distributed to provinces on 29th May, 1968, except those for Ontario and Quebec, which were only interim pending completon of these two provinces. A typical printout sheet is shown at Figure 3 . . . giving information for three buildings. In addition to the environmental information, it indicates the radiation contribution, as a portion of the total contribution, at the centre of each storey, for each wall and ceiling and the total contribution, referred to as a reduction factor.

FIGURE 4

Province	Number of zones	Survey data sheets processed
Newfoundland	1	2,607
Nova Scotia	3	2,052
Prince Edward Island	1	621
New Brunswick	2	5,623
Quebec	8	27,597
Ontario	7	54,667
Manitoba	3	5,126
Saskatchewan	9	3,372
Alberta: 1968 updating	3	435
1964 survey	3	4,431
British Columbia	6	6,309
Grand Total		112,840

Numbers and distribution of shelter spaces are not yet available but are presently being tabulated by the Central Data Processing Service Bureau.

Even though this project is now complete, continual updating must take place to ensure that all new construction is added to the inventory and utilized where possible in municipal plans, and that all demolished structures are taken off the inventory. The only updating that has been carried out so far is in the Province of Alberta, but plans are being developed now for updating other provinces this summer.

3. The 1968 Milestone

Unknown to most people and unnoticed by many civil emergency planners, delivery of the first batch of final survey results in May 1968, signalled the arrival of a very significant milestone in the total Canadian shelter planning spectrum. The beginning of the picture of the total inventory of potential fallout shelter space across the country had started; a first phase objective that had been planned almost ten years ago. The total picture however, will not be fully apparent until the information summaries of the numbers and distribution of shelter spaces have been produced and analysed.

In the year 1085, William the Conqueror ordered a survey of England to be made, which included an inventory and assessment of all existing property, and in 1086 the Doomsday Book, a national inventory of property and resources, was completed. Whilst one should not draw a parallel between the Doomsday Book of 1086 and a national inventory of existing fallout shelter spaee, they do have an very significant common base. The word 'Doomsday' means 'judgement day' and the survey was necessary before any national planning or judgement could be made with respect to taxation. Similarly no satisfactory national shelter planning can be undertaken without knowing the full extent of our resources and it is in this direction that the major shelter planning effort has been aimed up to the present time.

That then is the present policy on fallout protection! Simply stated, it is a course of action which, when complete, will provide three things:—

- a national inventory of existing potential fallout shelter space.
- information on which to carry out necessary shelter planning.
- information on which definite recommendations can be made concerning future development of the National Fallout Shelter Program.

With completion of the nation-wide survey, all of these three objectives can now be realized in a relatively short time. The question of how far we have advanced towards achievement of the provision of fallout protection for the public, is still extremely difficult to measure. Planning and development must proceed to the point were existing shelter at least can be effectively utilized in an emergency.

IV - A National Fallout Shelter Program

1. The Planning Spectrum

The spectrum of activities involved in the planning development and implementation of a fallout shelter program is quite broad and the total interrelationship of these activities, with asscociated activities of other programs, involving all levels of government tends to be somewhat complex. Additionally, the need for concurrent development of crisis management plans still further complicates the problem. A brief comment therefore on crisis management generally and on basic shelter planning would seem appropriate at this point.

2. Crisis Management Plans

The most recent concept of civil emergency planning is based on the premise that there will be some strategic warning, which introduces the feasibility of crisis management planning on a controlled respose basis.

What this means, of course, is that with well prepared crisis management plans, a very effective passive defence system can be built up in a relatively short time, provided that a firm base has been established. But let there be no misunderstanding about crisis management plans. Whatever the state of civil emergency planning, crisis management plans must be available and ready for implementation, but they are not a substitute for the careful detailed planning that must continue in peacetime. They are merely a tool by which the full value and effectiveness of the normal planning can be realized in an emergency.

Every municipality should develop and periodically update a crisis management plan. Amongst other things, it would include specific actions to be taken in relation to the public protection component and these would be:

- allocation and provision of shleter spaces
- dispersal arrangements
- radiological defence
- public information

as well as the many other activities of civil emergency planning.

With respect to the fallout shelter component, it is necessary to first examine what space is available, how it is located relative to the population and then at the local level of government allocation of shelter space.

In the first column of Figure 5 are suggested crisis management activity levels, the implementation of which would depend on the international situation of course. Under 'Action Decision' are general statements of the necessary action to be taken for each declared crisis level and the next column indicates the page where more detailed directions are given relating to the particular action decision. Annexures include a master control which would show action required in all activities for each crisis level as well as the location of all Crisis Management Plan documents, details and distribution of these documents, control documents which are instructions on specific crisis level and details of preparations to be effected, and information documents designed to keep officials, that perhaps have no emergency planning operations function, informed of the situation.

Figure 5. Crisis Management Plan

Level	Action Decision
1	Review and update crisis management plans. No public involvement. Federal and provincial governments only and independently.
2	Review and update CMP (federal, provincial and munnicipal). No public involvement, but a coordinated review.
3	Expedite development and completion of municipal shelter plans.
4	Effect low visibility preparations and advise public of action they should take.
5	Augment existing emrgency preparations. Advise public of supplies they need and further action they should take.
6	Crash action public protection program. Maximum preparations for fallout protection.

The action decisions shown here apply generally to all three levels of government and it is very important that a common system of crisis management planning be established to assure that appropriate effective action is taken when needed and to avoid the sort of situation that could result in one community being dispersed while its close neighbour is taking no action at all.

3. Basic Shelter Planning

All civil emergency planning is a peacetime function of the three levels of government which must proceed if lives are to be saved and the effects of nuclear war reduced.

On the left side of Figure 6 are shown the various activities of a fallout shelter program, with a few of the other civil emergency planning programs on the right. The purpose of the diagram is to indicate the fallout shelter activities and also to indicate their interdependency with other programs. These activities and programs are all superimposed by the delevolpment and periodic updating of crisis management plans. Some of these activities must go on all the time, while others cannot be started until some other activity is well underway. Research and development is a continuous function. Development of shelter policy has periods of major change interspersed with periods of relative calm and minor adjustments. Development and improvement of shelter space cannot go on until identification of existing and potential shelter space has been registered. Emphasis over the last few years has been on taking stock of avail-

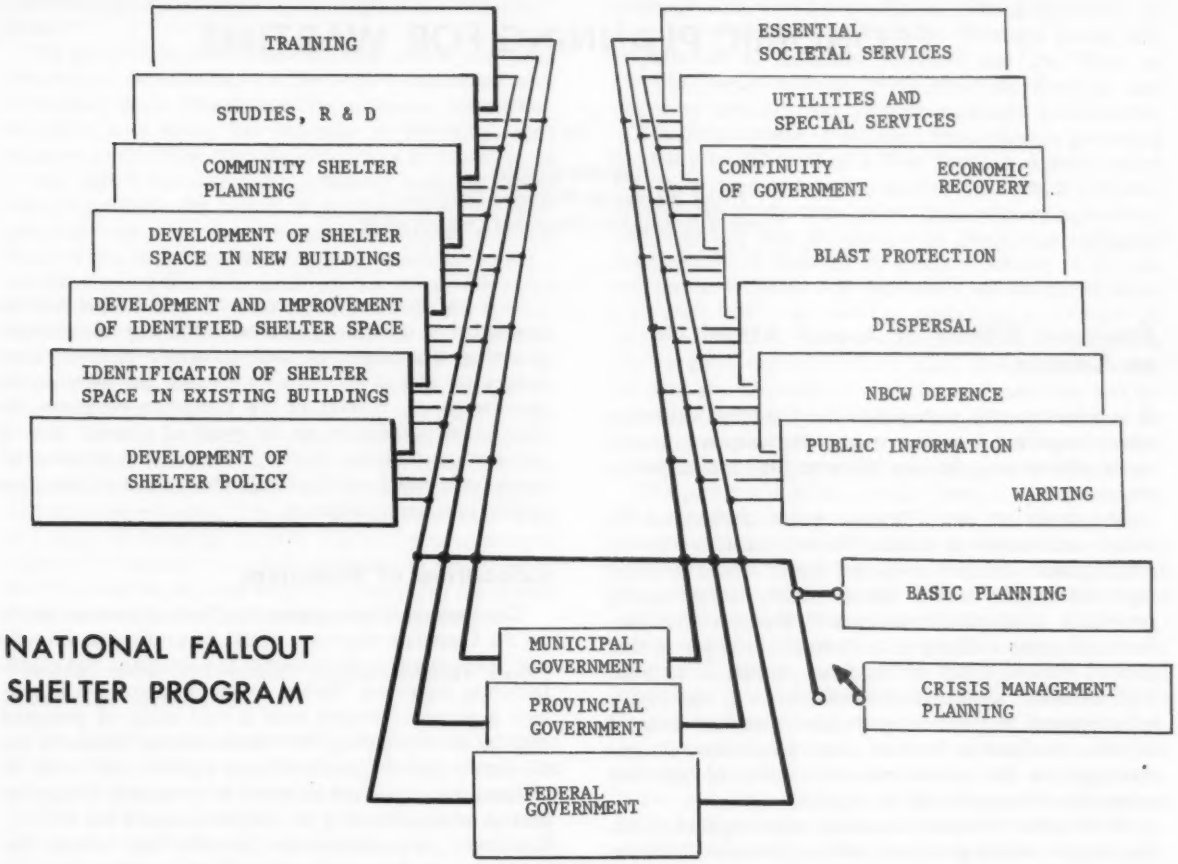


Figure 6.

able resources. We are now approaching a point in the evaluation of shelter planning in Canada, where its apparent amorphus character will begin to crystallize into some recognizable shape.

Development of shelter space in new buildings at the design stage is an extremely important activity in long term shelter planning. If included in plans for new construction fallout shelter areas can be provided at little or no increase in cost by applying the principles of shielding and slanting the design. It is essential therefore, that this avenue of providing economical fallout shelter be fully exploited. This, of course, is one of the shelter program options and cannot be justifiably considered in isolation from other aspects of a shelter program, since cost benefit comparisons of all options are absolutely necessary.

The process of community shelter planning represents a very significant phase of total shelter planning. This is the stage at which, after having carefully assessed what existing protection is available, maximum effective utilization of space is planned to meet the needs of each community.

The approach to development of public protection will not be the same for all communities, since risk levels vary across the country, and therefore, some combination of dispersal, fallout shelter and possibly blast shelter is a likely approach. Studies on mix options are presently being carried out with a view to establishing a public protection community planning guide. Regardless of the mix that may be applied to any given community however, the community fallout shelter planning procedures remain much the same.

The Future

It will be appreciated that in order to provide a basic security and survival capability, some fallout protection for the people is necessary. In 1964, the major work of fallout protection investigation had still to be done and development on a national basis could not proceed until a complete inventory had been taken. Within two months of completion of the Alberta survey, a decision was taken to complete the inventory and now with only one or two relatively short tasks to do, the day of decision should not be far away.

(*Continued on page 25*) **FALLOUT PROTECTION**

ECONOMIC PLANNING FOR WARTIME

by

John MacKinnon
Chief, Economic Planning Division,
Canada Emergency Measures Organization

Economic Effects of Armed Attack on Canada

It is trite but true to say that the Canadian economy, after a major war involving present-day weaponry, would, in an adverse way, be very different than it is in peacetime.

The extent of the difference would depend on the nature and weight of attack. Nuclear warfare directed only against continental United States would produce high density radioactive fallout which, under usually prevailing wind conditions, would threaten Canadian lives and bring industry to a standstill in much of that part of Canada south of the 50th parallel of latitude. This situation would apply particularly to the highly industrialized and heavily populated southern areas of Ontario and Quebec. Such an attack would have serious consequences for a relatively short space of time but economic recovery would be rapid.

On the other hand, direct nuclear attack against Canadian targets would pose very serious problems. Without advance planning for recovery actions, the nation could be seriously crippled for at least a generation. For example, on the basis that no preparation were taken for war, a total of ten 5-megaton weapons detonated on the ten most populous areas of Canada could destroy about 32% of Canada's population (with an even higher percentage of specialized industrial skills), 58% of the nation's "survival" industry (such as food processing and clothing manufacturing), 34% of its "recovery" industry (e g., basic manufacturing such as metal processing) and 44% of its port facilities. This estimated damage would result from the fact that Canada, in spite of its over three and a half million square mile area, has a very large proportion of its national resources, particularly manufacturing establishments and population, concentrated in a small number of metropolitan areas.

And yet, large segments of Canada's economic resources, because of this nation's geographic vastness, would be relatively untouched directly, even by a much heavier attack than the one postulated above. Primary industries such as farming, mining, fishing, lumbering, and, to a great extent, the production of hydro-electric power, would in particular be lightly affected. Canada is fortunate in having a large hinterland in which lies the means for the survival and rebuilding of the nation's economy.

It is the object of this article to outline what can be, and is being, done in peacetime in the way of economic planning. The object of such economic planning is to reduce the effects of attack on Canada and increase the percentage of survival of the Canadian economy, including its population, in the event of a major war. It includes coordination of the peacetime development of procedures which will facilitate the control of resources in time of a war emergency.

Relocation of Resources

One method of decreasing the effects of nuclear attack on the Canadian economy would be to disperse broadly and permanently such resources as population and manufacturing capability. Such a course of action would present a potential enemy with a vast array of potential targets, all of relatively low attractiveness. However the economic cost to Canada of such a procedure would be colossal, and could not seriously be proposed, (except as part of master planning for satellite cities of the future). Resources are concentrated where they are because the locations are the most practical for a whole host of reasons, such as climate, location of inputs, ease of transportation and proximity to markets. Some of these reasons are dictated by nature, others have developed during the 300 or so years since settlement of this land began.

On the other hand, relocation of mobile resources in peacetime, particularly as a "crash action" in time of an imminent emergency, would be a very practical measure. Such mobile resources include people, inventories, railway rolling stock and other vehicles.

The Need for Pre-Attack Emergency Economic Planning

The alternative to moving fixed resources, and the only feasible one, is to carry out, in peacetime, economic planning for emergencies in such a way as to ensure the optimum use of resources, fixed or mobile, which are likely to remain after an attack on this country. In this manner such resources can be utilized to ensure that the maximum number of persons can survive, that a contribution can be made towards the prosecution of the war, if still in progress, and that, based on surviving manpower and materials, the national ecenomy can be rebuilt. Control of resources has a great role to play in a war in the

"survival" phase, and also in the longer term "recovery" phase.*

The planning in which Canadian federal and provincial government departments are involved is concerned with controlling major objectives of the economy, rather than managing it in detail. For example, no intention exists to place government officials in factories to run them. It is only logical to assume that a factory manager knows how to combine the factors of production in the most practical way to produce the greatest output. The fact than an establishment has remained in business over a period of years is a testimonial to this ability. However if there were a dire need for an item A and only a lesser need for an item B, both of which could be manufactured easily by a particular factory, but its manager decided he would produce only the higher profit item B, then, in an emergency, government intervention would be expected.

The existing monetary system would be maintained, and the price system would be used wherever feasible, in preference to direct and indirect controls being applied without discrimination. The necessity for controls in some key areas of economic activity can be foreseen now; in other areas controls have to be prepared in peacetime so that they can be imposed with minimum delay for greater effectiveness if and when needed in an emergency.

Federal and Provincial Departments and Agencies Involved

The governmental departments and agencies involved in pre-attack emergency economic planning are, to the greatest extent possible, those which have a responsibility for the activities concerned in their peacetime context. This is in accordance with the federal government's view that emergency planning should be part of the normal operations of each of its departments, in which concept the provincial governments in general concur. The federal Department of Fisheries is planning the emergency aspects of catching, landing, processing and storage of fish. The federal and provincial Departments of Agriculture are responsible for the maintenance of farm production and the safety and wholesomeness of food. The federal Department of Public Works and its provincial counterparts plan for the control and use of all accommodation (housing and otherwise), while the Central Mortgage and Housing Corporation plans for the construction of emergency housing. The federal Department of Public Works also plans controls for resources used for engineering and construction purposes. The Department of Manpower and Immigration is responsible for developing and maintaining a capability to mobilize, allocate and control the emergency use of all civilian manpower, whereas the federal and provincial Departments of Labour develop a capability to control wages and to regulate industrial relations and working conditions. The Department of Finance, in conjunction with the Treasury Board, the Department of National Revenue and the Bank of Canada, would ararnge to maintain the financial and monetary systems and support economic stabilization.

The Department of Defence Production is preparing for the establishment of a War Supplies Agency which would, in an emenrgency, control the several activities involved in production (other than primary agriculture and fisheries) and distribution of goods. An additional Department of Defence Production activity is the development of plans and guidelines on measures which industrial firms can take in peacetime to reduce the adverse effects on them of war, and the dissemination of the resultant information to such firms. The division between the Department of Defence Production and the Cańada Department of Agriculture of responsibility for the control of processing of food and feed commodities (except fisheries products) is at present under review.

The prime role of the Canada Emergency Organization in economic planning and resource control is the peacetime coordination and stimulation of the sixteen activities involved. (See Figure 1, page 3.) Economic matters in general are also studied for their significance and applicability to civil emergency planning.

An ancillary role of the Canada Emergency Measures Organization is the development and operation of a data bank for Canadian resources. This bank can be analyzed by computerized and manual damage assessment/resource analysis methods, both for peacetime studies and wartime operations. To date, production, storage, population and other quantitative statistics and location data have been obtained from published or otherwise non-confidential sources. Data on 28 separate resource categories, containing 29,000 resource points (e.g., population centres, factories, grain elevators, mines, electric generating stations, etc.) have been processed. Data on a further 4,000 resource points in five categories are close to completion. A good cross-section coverage of data on the Canadian economy thus exists for emergency planning purposes.

The Dominion Bureau of Statistics and the federal Department of Fisheries are now assisting by supplying commercial data which, while respecting the anonymity of individual firms, should make possible even more detailed assessments of attack effects in future.

Consultation on economic planning and resource management matters takes place between Canadian Government Departments and their counterparts in other NATO nations, principally, because of interlocking geographic and economic considerations, the United States. The object of such consultation is threefold. Firstly, it ensures that Canada's wartime resource control agencies and those of other NATO nations will operate in a manner which is, wherever necessary, compatible one with the other. Secondly, it provides a Canadian voice in the development of the overall NATO wartime resource con-

(*Continued on page 25*) **ECONOMIC PLANNING**

*No attempt is made here to gloss over the economic difficulties which would be involved in the wartime and post-war environment. These are discussed quite fully in the article "Nuclear Attack: The Economic Challenge and Response", in the EMO National Digest, of April 1967 (vol. 7, No. 2).

THE EFFECTIVENESS OF CIVIL DEFENSE

by

Raymond D. Gastil and Robert A. Krupka
Hudson Institute, Inc.

On January 30, 1968, the authors, research scientists with the Hudson Institute of New York, appeared before the Federal Government Standing Committee on External Affairs and National Defence. The following paper was presented at that hearing and was accepted by the Committee to be reproduced in Minutes and Proceedings.

Peacetime civil defense systems may be conveniently divided into high budget ($10-50/cap. per year) and low budget systems ($0.50-2/cap. per year). In the first category are primarily blast shelter systems, while in the second there is a variety of programs ranging from fallout shelter to mobilization base approaches. After examining systems at both of these levels we will briefly consider questions of long-term recovery, popular attitudes and the special Canadian situation. We regret that our experience is with calculations for the United States, but the arguments would be approximately the same except for scale.

1. High Budget Peacetime Systems

In order to judge the effectiveness of civil defense against possible future Soviet nuclear attacks, we should re-examine the estimates which have been made, and see how these might reasonably be modified in terms of alternative assumptions. Let us examine the Figure 1, adapted from a graph developed by the Office of Civil Defense in 1963. In order to interpret this graph we must understand that this is an attack of more than five thousand megatons, 65% of which is surface burst. Although targets are both military and urban, nearly every city of any size is hit, many repeatedly. Current projections for Soviet forces suggest that it would be very unlikely that the Soviets could or would deliver such an attack in 1970. Although the Soviets may have more than 5,000 MT's in 1970, it would be very unlikely that this amount would reach the United States. First, we would have to assume virtually no attrition by U.S. forces of Soviet capability during the war. Second, we would have to assume that U.S. defensive capabilities against submarines, missiles, or airplanes were practically non-existent. Third, we would have to assume a high reliability for Soviet systems. Fourth, we would have to assume that the Soviet Union would be willing to fire essentially everything that it had, saving very little for post-attack bargaining purposes. We would judge, then, that this attack is an unrealistically large attack for the immediate future, although in the longer term it is surely conceivable that attacks of this size could be delivered against the United States.

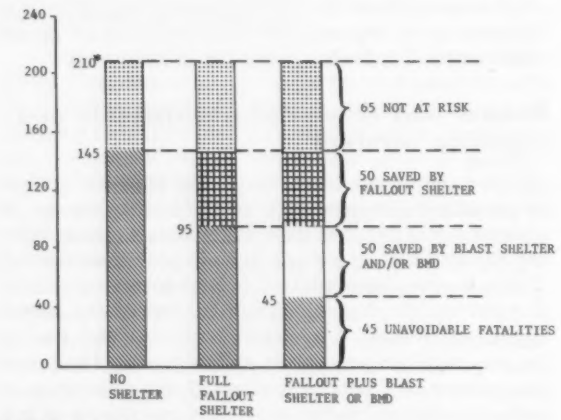


Figure 1 Lifesaving Potential (Millions of People)

If we look at the types of programs being used to defend the U.S. population, we should note that blast shelter and ABM were estimated to give roughly the same return for the money. We are speaking of civil defense here, so we will assume that this is a large blast shelter program. The system is a $40 billion program (perhaps spent over ten years), and the fatalities are "unavoidable" within the limits of this size program. We should also note that the 50 million lives saved by fallout shelters were saved in this case by a large program of shelter construction. The present OCD system of marking shelters in existing buildings would achieve part of this saving, but not all.

One can conclude from this bar graph that civil defense could make a great deal of difference in the number of fatalities. Looking at the 45 million unavoidable fatali-

This paper represents the views of its author. There has been only limited circulation of the Paper to the Institute staff and no formal review procedure. No opinions, statements of fact, or conclusions contained in this document can properly be attributed to the Institute, its staff, its Members, or its contracting agencies.

ties, however, critics have concluded that civil defense would not make "enough" of a difference.

Some studies have claimed that most of the "unavoidable fatalities," suggested in OCD studies such as this, are, in fact, avoidable within the conventional limits of the discussion. This has led to a considerable divergence in estimates of what can be accomplished by sheltering systems.

Let us examine the reasons for these differences. The 1963 OCD concept was for the construction of blast shelters ranging from 10 to 30 psi (the relatively low level of protection which can be obtained without the use of blast doors). Studies which achieve lower vulnerabilities for the dollar are based upon the use of a range of shelter hardnesses up to 100 or 500 psi, as is now common in OCD studies. Shelters in these systems are somewhat more expensive per person, but their life-saving potential in crowded urban areas more than makes up for the added expense. Using these latter calculations, William Brown has suggested that blast shelters may be able to achieve savings as in the following graph:

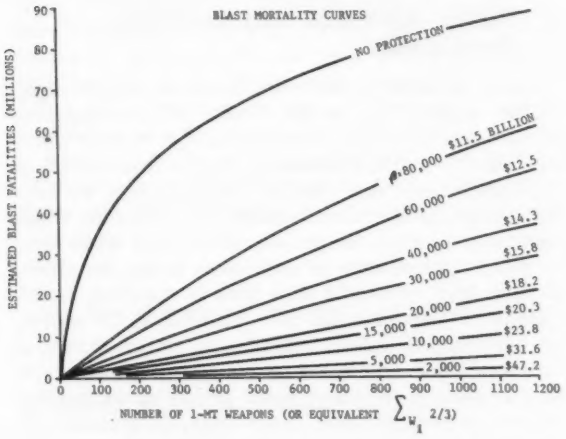


Figure 2 Blast Mortality Estimates for Postures Based on a Uniform Vulnerability (A) of the Urban Population

In Brown's conception, shelters are to be arranged so as to give the opponent a uniform targeting option in terms of the vulnerability of the population. Data on this chart stand for the number of people that would be killed by each megaton-equivalent weapon, optimally targeted against the United States for population effect. We note from this chart that the number of fatalities expected from a 1,200 megaton-equivalent attack directed against urban centers would be only 5 million. Since large megaton attacks are generally calculated on the basis of much larger weapons than 1 MT, and the larger portion of most attacks is usually against military targets, a 1,200 megaton-equivalent attack against urban populations is approximately the same size as the OCD attack described above. On Brown's graph this very low vulnerability is achieved for $31 billion. We would not want to be too precise about these figures so we can assume that this is about a $40 billion program. But the program appears to be nearly ten times as effective.

Our judgment is that the use of very hard blast shelters and something like the Brown's approach should achieve more than the original OCD estimates. However, much of the gain in unlikely to be achieved. The OCD estimates were based on an assumption that at least 10% of the people would fail to use shelters. It can easily be seen that reducing fatalities to 5 million in a full shelter program must rest on an assumption of essentially 100% effective use. Assumptions of 100% use are wrong for a number of reasons. First, one can assume that a few people will be confused and uninformed. Second, it is hard to build a blast shelter system in which tactical warning that missiles are on their way will allow 90% of the people sufficient time to get to shelter. It is possible that there will be other kinds of warning earlier, and most urban people will be in blast shelters before opponent attack, but the significance of this probability is very hard to judge. One must also assume that if we rely on shelters, with very little ABM or other defensive capability, urban destruction and the resulting isolation of millions in cities into which rescue workers cannot go for days will lead to additional post-attack fatalities. There are also likely to be a number of system limits. For example, in certain areas such as Manhattan Island or New Orleans, it might not be possible for a blast shelter system to succeed against a determined effort to overwhelm it by flooding. Political considerations will also reduce the cost-effectiveness of any practical sheltering system. Perhaps, then, the original OCD estimates of "unavoidable fatalities" in the very large attack could be reduced by more careful attention to the size and location of shelters, but civil defense alone cannot be relied upon to achieve drastic reductions.

2. Low Budget Civil Defense Systems

Let us look, then, at another attack with a range of alternative low budget systems (Table 1). First, the figures illustrate the difference between what could be accomplished by the present OCD marking program and by a fallout shelter construction program. The marking and stocking program (NFSS) has probably cost over $300 milllion by now, but the shelter construction program would cost over ten times that. Only the complete fallout program essentially eliminates fallout casualties. It should be noted that since fallout descends one to several hours after nuclear groundbursts, the problem of reaching fallout shelter is very different from that of reaching blast shelter. If undestroyed shelter is available locally, then people will move to fallout shelters in time. We would suggest that if a nation wishes to pay for a complete fallout shelter program and contemplates building shelters with protection factors of 500, then it should consider the possibility of changing its fallout shelter plans to low psi blast shelters. The costs would not differ greatly.

TABLE I
1965 War

195 Million People S.U. Mixed Counterforce and Countervalue Retaliation				4,336 MT Groundburst (1,140 MT-Equivalent)			
Program		Protection Factors		(Mortalities (Millions) Blast	F/O	Total	Surv.
No protection			2.5	64	92	156	38
Gov't. Survey	Urb:	25%	100	64	37	101	93
		25%	40				
		25%	20				
		25%	2.5				
	Rur:	20%	40				
		40%	20				
		40%	2.5				
Complete Fallout		50%	100	64	.1	64.1	130
		50%	500				
50% Evacuation	Urb:	50%	100	32	8	40	154
		50%	40				
	Rur:	50%	100				
		50%	20				
80% Evacuation	Urb:	100%	500	13	5	18	176
	Rur:	25%	500				
		50%	100				
		25%	20				

It is clear that the government survey is very cost-effective against an attack of this type and that it can accomplish a great deal. However, it should also be clear that it is only one step and that other, perhaps more important, steps can be taken. These steps include changes in attitude from peacetime to wartime. For example, it should be understood that in areas with heavy potential fallout damage it may be preferable to crowd those shelters with high protection factors rather than allow people to go into shelters with protection factors of 20 to 40. In some areas lives will be saved by having protection factors well above 100.

Many suggestions for improved very low budget systems have been based on the view that nuclear war will not suddenly descend on the peacetime system. We believe that it is quite likely that a general nuclear war will come only after a period of deep crisis. Possibly there will be a more or less gradual escalation through conventional war to tactical nuclear war outside of North America to all-out nuclear war. In this period of crisis and escalation, it may be quite possible that enough time would be available to achieve many of the goals of more expensive civil defense programs. Developing plans to exploit these opportunities is what we call a *mobilization base*.

We think particularly that it would be possible to have plans, procedures and training by which the protection factors of shelters could be upgraded in extreme crises so that many of the fallout fatalities which the government survey currently allows could be avoided. Fallout protection is attained by the addition of mass, whether it be water or dirt or concrete or wood. It can also be achieved through methods of decontamination during fallout. Therefore, in many situations protection can be significantly improved in a matter of hours.

We also believe that a great deal can be accomplished by making plans and preparations for evacuating at least part of the urban population previous to nuclear attack. Unless everything is attacked at once partial evacuations can occur even during attack. Since heavy fallout can be predicted in some cases many hours ahead of its occurrence, evacuation from some areas could literally outrun the fallout. In the face of all-out nuclear war, we think it is undesirable to have people go into, or stay in, densely crowded urban centers. We think it will be the intuitive reaction of people to leave these areas and that their intuitions will be essentially correct. It is particularly desirable to develop alternatives for people who live at points targeted in nearly all scenarios. Generally, fallout protection in rural areas will be available for refugees or easy to upgrade. It should also be noted that partial urban evacuation raises the average protection available to those people left in cities because the better facilities may be used by the remaining people.

3. Public Attitudes and Recovery Possibilities

Panic reactions are not as important as often thought. Studies suggest that under almost all circumstances people generally react to extreme danger in ways which are in their interest. Historically, people have wanted to build and rebuild after disaster. Most recently, we have the example of the Jewish community in Europe which underwent the worst disaster of modern times. While there are psychological scars on individuals today, the ability of most Jews to rebuild their lives in America, Israel, Canada, or elsewhere has been outstanding. Of course, the likelihood of orderly rebuilding is greater if there is less destruction and fewer people killed. However, as long as there is food and water available, we imagine that recovery will proceed. In any event, the greatest suffering will be in the war and its immediate aftermath, and it is toward the alleviation of this suffering that our plans should be primarily directed.

4. Special Canadian Considerations

Civil defense in Canada should be free of some of the disturbing aspects of the civil defense controversy as it has affected the United States. A liberal country such as Sweden, which finds itself outside of the power bloc confrontation is able to spend $3 per capita for blast shelters and evacuation plans. It drafts its civil defense workers and requires blast shelter in private dwellings. One of the reasons for the larger efforts of Sweden or Switzerland is that the argument cannot be made that their civil defense is in any way threatening to another power or will induce an arms race. While Canada's position is not quite analogous to that of Sweden, it is much more difficult to argue that the Russians will be greatly concerned about Canadian civil defense actions than it

is to argue that they will be concerned about American actions.

While we believe a good case could be made for Canada following the Swedish approach, we imagine that political constraints will make it more likely that a less expensive approach will be adopted here. This approach should include considerable interest in the discovery of all possible fallout shelter, including the provision of shelter in both urban and rural localities for the same population. It should include provision for crisis upgrading. The evacuation alternative is also more available to Canada than to the United States, for Canada will not be as likely to destabilize crises by evacuating. Canadians might particularly consider the possibility of partial evacuation from the path of fallout after nuclear explosions in the United States.▲

FALLOUT PROTECTION (*Continued from page 19*)

What events then must take place before a decision can be made with respect to the provision of fallout protection for the Canadian people?

All necessary information has been gathered now. Protection factors have been computed, potential shelter spaces identified and detailed results are with the provinces. Data summaries are presently being prepared by the Central Data Processing Bureau, and analysis of the results to determine the numbers and distribution of shelter spaces in specific locations as well as many other facets, will commence as soon as these summaries are available. Using the analysis as a working base, a series of fallout shelter program options must be identified and developed and a cost benefit study made of each option. These will then be ranked on the basis of cost benefit, feasibility and available resources and then recommendations to the government will be prepared.

One further note may be worthwhile considering concerns fallout protection in the total picture of public protection. The total survival capability in an emergency will depend on many things, but in particular it will depend on the effectiveness of public information, dispersal and reception plans, blast protection, if considered economically feasible, and provision of adequate fallout protection for those people in risk. Community fallout shelter plans will most certainly have to be developed very carefully in conjunction with all of the facts of public protection. Therefore, adequate planning guide lines for the development of community public protection programs should be established prior to further component development.▲

ECONOMIC PLANNING (*Continued from page 21*)

trol agencies and in the eventual agencies themselves. Thirdly, it eanbles a considerable exchange of information and techniques in matters of common interest in the economic planning and resource control field.

Summary

Effects on the Canadian economy of a major war, particularly one involving nuclear weapons, would be great, even if only a small number of nuclear weapons struck this country. However, because of the immense area of Canada, a considerable part of this nation's ecoomy would not be directly touched by blast, thermal or serious fallout effects from even a heavy attack.

Economic planning is necessary to ensure the best use of what would be left of the Canadian economy after a major war. The development of the proper plans and procedures will increase the number of eventual survivors, assist in prosecution of the war, and enable the economy to be rebuilt.

Responsibilities for emergency economic planning activities are shared between federal and provincial government departments on the same basis, where possible and appropriate, as their responsibilities for peacetime roles. The coordination of such planning is the responsibility of the Canada Emergency Measures Organization.▲

YOUNG BELIEFS ABOUT CIVIL DEFENSE

"A Pilot Study of Young American Beliefs and Knowledge about Civil Defense"

by

Bradley S. Greenberg, Joseph R. Dominick, Edward Razinsky
for
Office of Civil Defense
Office of the Secretary of the Army

Introduction

The report contains the preliminary analysis of data gathered from approximately 400 American teenagers with regard to the information and values that young Americans have about civil defense and fallout shelters.

There are some 30 million teenagers in the United States and such a group constitutes a sizeable "special audience" for civil defense information. Several reasons exist for focusing on this group: Young people are a receptive audience for a civil defense information program. Moreover, values for civil defense and fallout shelters form early in life, and the extent to which these values are favorable will facilitate the processing of information to these people as they mature. Young people can also supply a supportive, complementary avenue of knowledge into homes already served by other channels of information. Further, they may provide an initial channel of knowledge into many homes not otherwise adequately reached by general means of communication, e.g., areas of urban poor.

The main intention of this project was to identify some individual characteristics and channels of information which lead young people to hold favorable values about civil defense and home shelter protection. This information would make it possible to identify individual characteristics and channels of information individual characated with the holding of favorable values about civil defense. It would also make it possible to direct educational efforts toward those groups of young people who lack adequate information or who are disinclined toward civil defense. Finally, it would facilitate the channelling of information to support the already favorable beliefs among many segments of the youth audience.

Executive Summary and Policy Implications

This report sought to answer two questions: (1) What is the diffeernce between two groups of teen-agers in terms of civil defense information and attitudes, where one group has been exposed to an intensive in-school civil defense program and the other has not; and (2) What difference in information and attitudes exist between younger and older teen-agers (14 vs. 17-year-olds)?

Some major differences were found between those who had received the in-school program and those who had not. In-school training was associated with . . .

1. Having heard more about public fallout shelters from teachers and civil defense people. In addition, those same students read more about fallout shelters in magazines.
2. Mentioning government pamphlets, teachers, school programs and civil defense people as their most useful source of information. Those without such a school program cited radio and television as most useful.
3. Knowing more accurate information about civil defense and fallout shelters. Eighty-seven percent of these receiving the in-school training could correctly identify the black and yellow fallout shelter sign, compared to 58 percent of the students without such a program. Furthermore, in a six-item test of civil defense knowledge, the former were significantly more knowledgeable.
4. Telling others something about fallout shelters or civil defence was related to exposure to the in-school program. In particular, this was telling others something the others didn't already know.

In addition, we found that:

1. Overall attitudes toward civil defense and fallout shelters were little affected by the in-school training program. In terms of general evaluation, shelters were judged as equally important, useful and favorable by the two groups of younger teenagers, with and without the in-school training program.
2. Both groups held similar perceptions of shelter protection and shelter conditions in the event of war. However, those who had not received any information in school made more extreme estimates of how long one would have to stay in a shelter. They tended to say it would be either a very short period of time or a very long period.
3. The exent of the in-school training was apparent: 68% of those in the school program had heard outside speakers talk about civil defense, 78% reported seeing a movie about CD, and 84% had received pamphlets or booklets. Comparable percentages for the group of youngsters without the school program were 15%, 43% and 21%.

Some major differences were found between the two age levels. Here, we will compare the 8th and 12th graders in the schools with an information program:

1. The older students heard more about public shelters from radio, newspapers and magazines than did the younger ones, but were the same in rating government pamphlets, teachers and school programs as the most useful sources of information.
2. Both groups were alike in their ability to identify the fallout shelter symbol, and had equivalent levels of information about civil defense, in terms of our information quiz.
3. The younger teen-agers were consistently more positive than the older ones in terms of how much protection they thought that shelters would give. They thought the shelters would protect more people, that they would more likely be able to get to a shelter and that survival chances would be better.
4. The younger respondents also felt that shelters would, in general, be more useful and more comfortable if it became necessary to use them.

In general, then, it seems that the principal positive effects of the school civil defense program were in terms of informational and communication behaviors. The young people were better informed, used more and different sources of information, talked more about CD and shelters, etc. To the extent that age makes a difference, it appears to manifest itself in somewhat less favorable CD attitudes. Susequent reports will examine these characteristics more closely.

Potential Policy Implications

In the geographic area we studied, the deliberate attempt to institute an in-school program that discussed civil defense and fallout shelters on a systematic basis was valuable. At least it was successful in terms of transmitting information, making young people more aware and more informed about these topics, and making them more sensitive to civil defense subjects. If these are meaningful goals, then to a considerable extent they were achieved.

To the extent that one wishes to form more receptive attitudes among young people, there was little evidence that the information program did that. Most of the young people were already receptive to civil defense concepts, and seemingly did not become any more receptive — although they became better informed.

Attitudes tended to be less favorable among the older teen-agers, a phenomenon we reported in our earlier research, as well. As yet, we cannot say that the attitudes become less favorable over time, or that the older group in this geographical area had originally experienced less favorable perceptions. Our subsequent work with these data and similar data will be to tease out potential reasons for the holding of maximally favorable and unfavorable postures toward civil defense among young Americans.

Epilog

We asked all of the youngsters we interviewed to respond to the notion of Civil Defense in terms of what may be considered a 'profile' or 'image' of that topic. We shall deal with this more extensively in later reports, but we think that the basic data provide an excellent summary of the young people's attitudes towards Civil Defense, as a concept.

Consistently, the youngsters who had been exposed to a systematic program of information thought more favorably, in terms of these kinds of attitudes. They rated civil defense as wiser, more important, more interesting, bolder, safer — and more expensive — than did the other teen-agers. Their judgments are more intense on virtually each attribute. Overall, one may observe that the negative side of the scales are not used. We are dealing with differences in degree of favorability of perceptions, not with differences between favorable and unfavorable judgments.

It is the sources and factors which account for these dispositions that our subsequent reports will examine.▲

EMO NATIONAL DIGEST

Index — 1968

Vol. 8 No. 1—February

House of Commons Statement	*Hon. C. M. Drury*
Emergency Measures in Schools in the Metropolitan Winnipeg Area	*Report*
Canada EMO Seminar — Soviet Foreign Policy	*Prof. Richard Gregor*
The Nuclear Balance	*Reprint*
U.S. Civil Defense Survey — 1966	*O.C.D. Report*
EMO National Digest Index — 1967	

Vol. 8 No. 2—April-May

Federal Emergency Measures	*C. R. Patterson*
S.D.C. Symposium	*Reprint*
Exercise "Shakedown"	*Report*
Canada EMO Seminar —The World Today	*John Gellner*
The Skoplje Earthquake	*Branko Pavlovic*
Human Behaviour in Disaster	*Dr. Horace Beach*

Vol. 8 No. 3—June-July

PUBLICATION OF THIS EDITION WAS SUSPENDED

Vol. 8 No. 4—August-September

Prime Minister's Statement (Extracts)	*Rt. Hon. P. E. Trudeau*
Structural Dynamics Research	*W. A. Johnston*
Radiological Protection Report	*A. H. Blake*
Municipal Emergency Operations	*U.S. Report*
A Nuclear Analysis	*Kenneth Gatland*

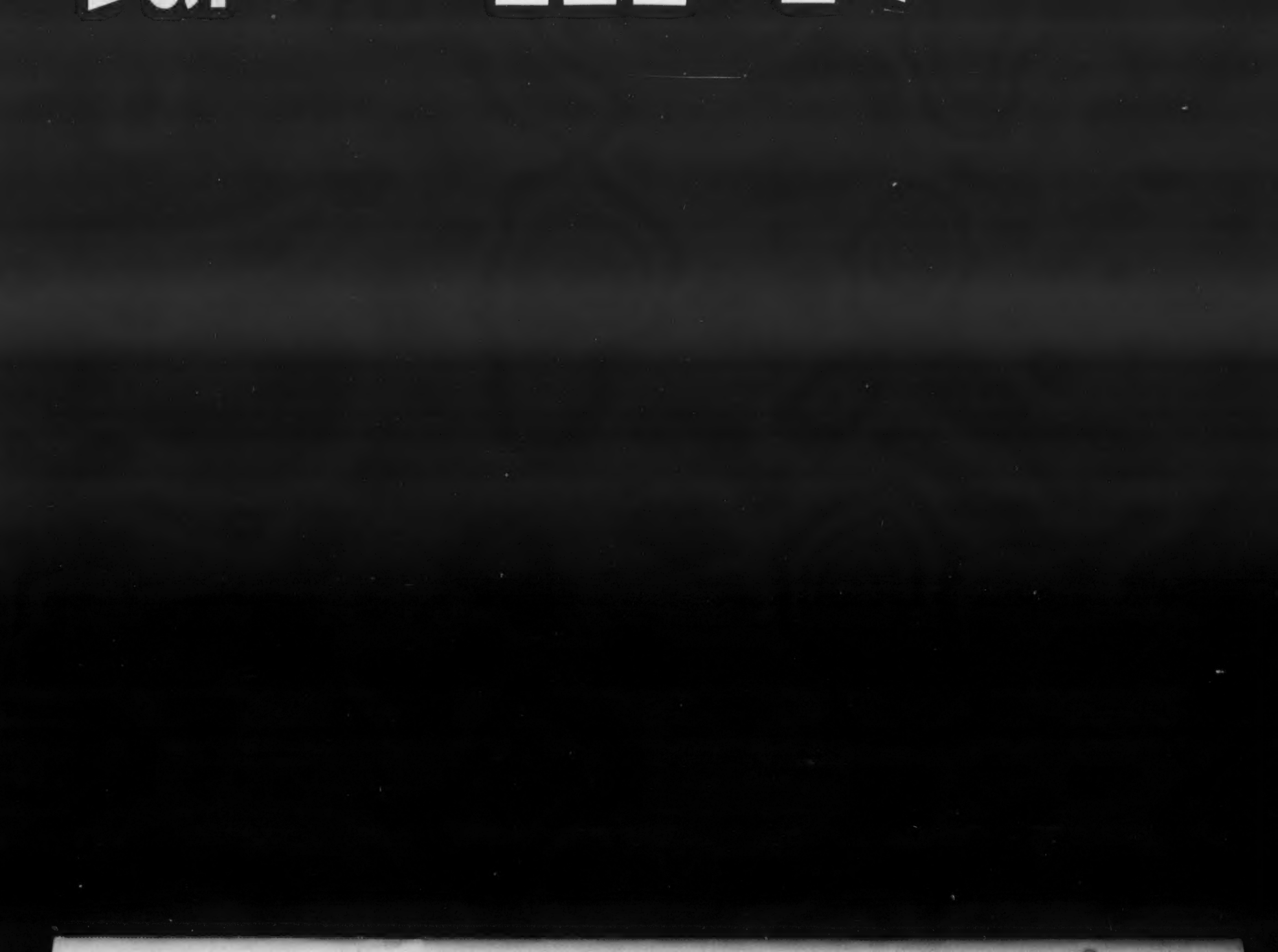
Vol. 8 No. 5—October-November

Radiological Defense in Canada	*A. H. Blake*
On Reorganizing After Nuclear Attack (Part I)	*William M. Brown (Rand Corp.)*
Nova Scotia Emergency Planning	*Gordon Grant*
Canada EMO Blast Tests	*W. A. Johnston*
Operation Woodburn 1968	*Alberta EMO Report*

Vol. 8 No. 6—December 1968 - January 1969

National Emergency Measures Planning — 1968	*C. R. Patterson*
Survivability of the Canadian Telecommunications Network	*Report*
Civil Defence in Australia	*Report*
Statement on Quebec Civil Defence	*Hon. Yves Gabais*
On Reorganizing After Nuclear Attack (Part II)	*William M. Brown (Rand Corp.)*

If undelivered return to:

The Queen's Printer, Ottawa, Canada

CANADA
POSTAGE PAID
PORT PAYÉ